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PULPWOOD PRODUCTION in the Northeast 1966

by Neal P. Kingsley

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COVER PHOTO. — Scaling balsam fir pulpwood in Coos County, New Hampshire.

PULPWOOD PRODUCTION CONTINUES TO RISE FOR FOURTH YEAR

PULPWOOD production in the Northeast continued to climb in 1966 for the fourth consecutive year. Total production of all forms of pulpwood (table 1)—roundwood, pulpwood chips, and miscellaneous wood-industry byproducts—amounted to 5,737,700 cords in the 14 Northeastern States.[1] This total represents a gain of 604,900 cords or 12 percent over the 1965 total of 5,122,800 cords. Since 1963, when this annual survey of pulpwood production in the Northeast was begun, total pulpwood production in the 14 states has risen by 1,158,700 cords or nearly 25 percent (fig. 1).

[1] Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont and West Virginia.

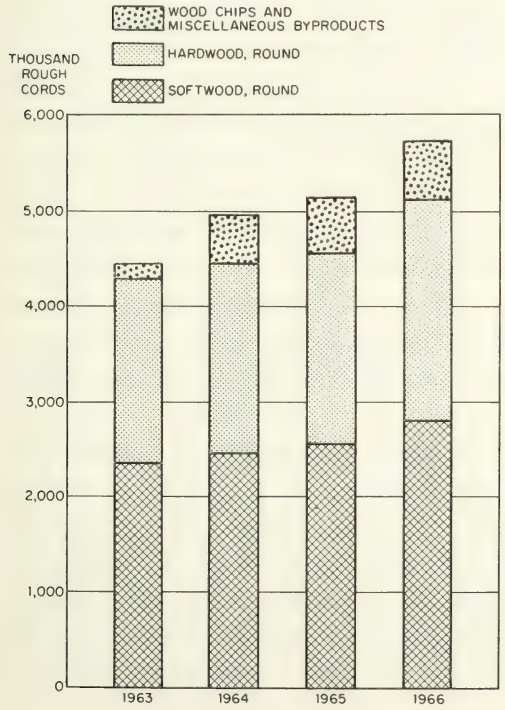

Figure 1.—Total pulpwood production in the 14 states of the Northeast, 1963-66.

Northeastern woodpulp mills received a total of 6,070,700 cords of all forms of pulpwood in 1966 (table 2), while 5,737,700 cords of all forms of pulpwood were produced in the region. Thus the region produced a quantity of pulpwood equivalent to nearly 95 percent of the total pulpwood received by mills in the Northeast. This means that the Northeast received slightly more than 5 percent more pulpwood in 1966 than was produced in the region.

ROUND PULPWOOD

The production of round pulpwood rose 569,100 cords from 1965, to total 5,159,600 cords in 1966. This represents a gain of 12 percent over the 1965 total of 4,590,500. Also, 1966 is the first year of record when round pulpwood production in the Northeast exceeded 5 million cords.

Northeastern woodpulp mills received a total of 5,488,800 cords of roundwood (table 4) in 1966. Thus, as in 1965, the amount of roundwood produced in the Northeast amounted to 94 percent of the total roundwood receipts.

Ohio Ups Roundwood Output Nearly 24 Percent

Ohio showed the greatest percentage increase in roundwood production of all the Northeastern States. In 1966 Ohio produced 336,700 cords of roundwood—64,200 cords or 24 percent more than in 1965. Thus Ohio moved from the fifth largest producer in 1965 to the fourth largest in 1966, exchanging places with West Virginia.

Pennsylvania, which produced 627,600 cords of roundwood in 1966, ranked second in percent gained, an increase of 19 percent above its 1965 production. New York increased its production by 18 percent to produce 439,000 cords in 1966 and rank third in percent gained. Although Maine, the region's largest pulpwood producer, harvested 350,200 cords more in 1966 than in 1965, its total production (2,767,600 cords) was only 14.5

percent higher than in 1965 and the state ranked fourth in percent gained.

Several states showed declines in production. However, most of these states are not major pulpwood producers. Rhode Island dropped 52 percent from 1965, Connecticut 34 percent, and Kentucky 3 percent.

Delaware Shows 68 Percent Increase Since 1963

Between 1963 and 1966, Delaware showed the largest percentage increase in round pulpwood production of all 14 states. In 1963 Delaware produced 26,400 cords and in 1966 it produced 44,300 cords. This 1966 total represents a 68-percent gain since 1963. By comparison, Ohio showed a 42-percent gain and Maine a 29-percent gain over their 1963 totals.

Softwood Percentage Drops 2 Percent

Softwoods accounted for 54 percent of the round pulpwood cut in the Northeast in 1966, down from 56 percent in 1965. All states except Delaware, Maine, and Vermont produced less softwood in 1966 than in 1965.

Both spruce and fir, and hemlock and tamarack, were up from 1965; but pine was down nearly 7 thousand cords. Spruce and fir accounted for 71 percent of the softwood, hemlock and tamarack 10 percent, and pine 19 percent. In 1965 these percentages were 71, 9, and 20, respectively.

All states except five—Connecticut, Maryland, Massachusetts, Rhode Island, and West Virginia—showed significant increases in hardwood production. Of the hardwood species groups, aspen and yellow-poplar accounted for 4 percent as in 1965. The oak and hickory group gained 2 percentage points—from 26 percent in 1965 to 28 percent in 1966. The other-hardwood group dropped from 70 percent of all hardwoods in 1965 to 68 percent in 1966. The other-hardwood group includes all hardwood species found in the Northeast other than the oaks, hickories, aspens, and yellow-poplar.

Round Pulpwood Production In Eighteen Counties Exceeds 50 Thousand Cord Mark

Eighteen counties in five Northeastern States produced more than 50 thousand cords of round pulpwood each. Eleven counties were in Maine, three in Pennsylvania, two in New York, and one each in Maryland and New Hampshire. Sixteen of these counties —those in Maine, New Hampshire, Pennsylvania, and Maryland— produced more than 50 thousand cords in 1965 as well as in 1966. St. Lawrence and Essex Counties in New York returned to the list of top producers after a short absence. St. Lawrence County exceeded the 50-thousand-cord mark in 1963 but failed to do so in 1964 and 1965. Essex County made the list of top counties in 1964 with 56,400 cords, but fell short in 1965. Thus none of these 18 counties is new to the list of over-50-thousand-cord counties.

These 18 counties produced a total of 3,143,000 cords of round pulpwood or 61 percent of the region's total. But these counties account for only about 21 percent of the region's commercial forest land.[2] Thus about 21 percent of the commercial forest land provided 61 percent of the round pulpwood cut in 1966.

The top counties in order of highest production are:

County and state	*Thousand cords*	*County and state*	*Thousand cords*
1. Aroostock, Maine	576.1	10. Clearfield, Pa.	78.5
2. Somerset, Maine	483.2	11. Kennebec, Maine	74.0
3. Penobscot, Maine	391.1	12. Hancock, Maine	72.2
4. Piscataquis, Maine	324.5	13. Huntingdon, Pa.	61.2
5. Washington, Maine	226.4	14. Bedford, Pa.	56.0
6. Oxford, Maine	196.5	15. St. Lawrence, N. Y.	53.8
7. Coos, N. H.	184.4	16. Garrett, Md.	53.3
8. Franklin, Maine	127.2	17. Cumberland, Maine	52.8
9. Waldo, Maine	81.1	18. Essex, N. Y.	50.7
			3,143.0

[2] Commercial forest land is defined as forest land that is producing or is capable of producing timber crops and that is not withdrawn from timber utilization by statute or administrative regulation.

INTENSITY OF ROUND PULPWOOD HARVEST OF 1966

By comparing the round pulpwood harvest by counties (fig. 2) and the harvest per thousand acres of commercial forest land by counties (fig. 3) we can see that some counties that produced large volumes of wood had a relatively light cutting intensity and vice versa. For instance, Hancock County in Maine produced over 50,000 cords (fig. 2), yet Hancock County produces between 50 and 100 cords per 1,000 acres of commercial forest land (fig. 3). The reverse of this situation is seen in McCracken County, Kentucky. McCracken County produces 50 to 5,000 cords, yet produces 100 to 150 cords per thousand acres of commercial forest land. From this, we can see that the total production of pulpwood in a county is not necessarily an indication of the intensity of the pulpwood harvest in the county.

Figure 3 indicates the volume of round pulpwood cut per 1,000 acres of commercial forest land; it does not indicate whether or not a particular county's cutting intensity is too high or if the county's forests are or are not being overcut. The cut for pulpwood is only one of several factors that must be considered and analyzed in detail before one could reasonably conclude that any area is or is not being overcut. Among these other factors are: the average annual timber cut for all forest products, the average annual growth rate of the timber, the proportion of land classed as commercial forest land that is actually available for timber cutting (Will the owner cut timber at present prices?), the species composition of the forest, the level of stocking (Does stocking need to be increased or decreased?), and many more. Thus, to accurately determine whether or not an area is being cut too intensively would entail considerable study.

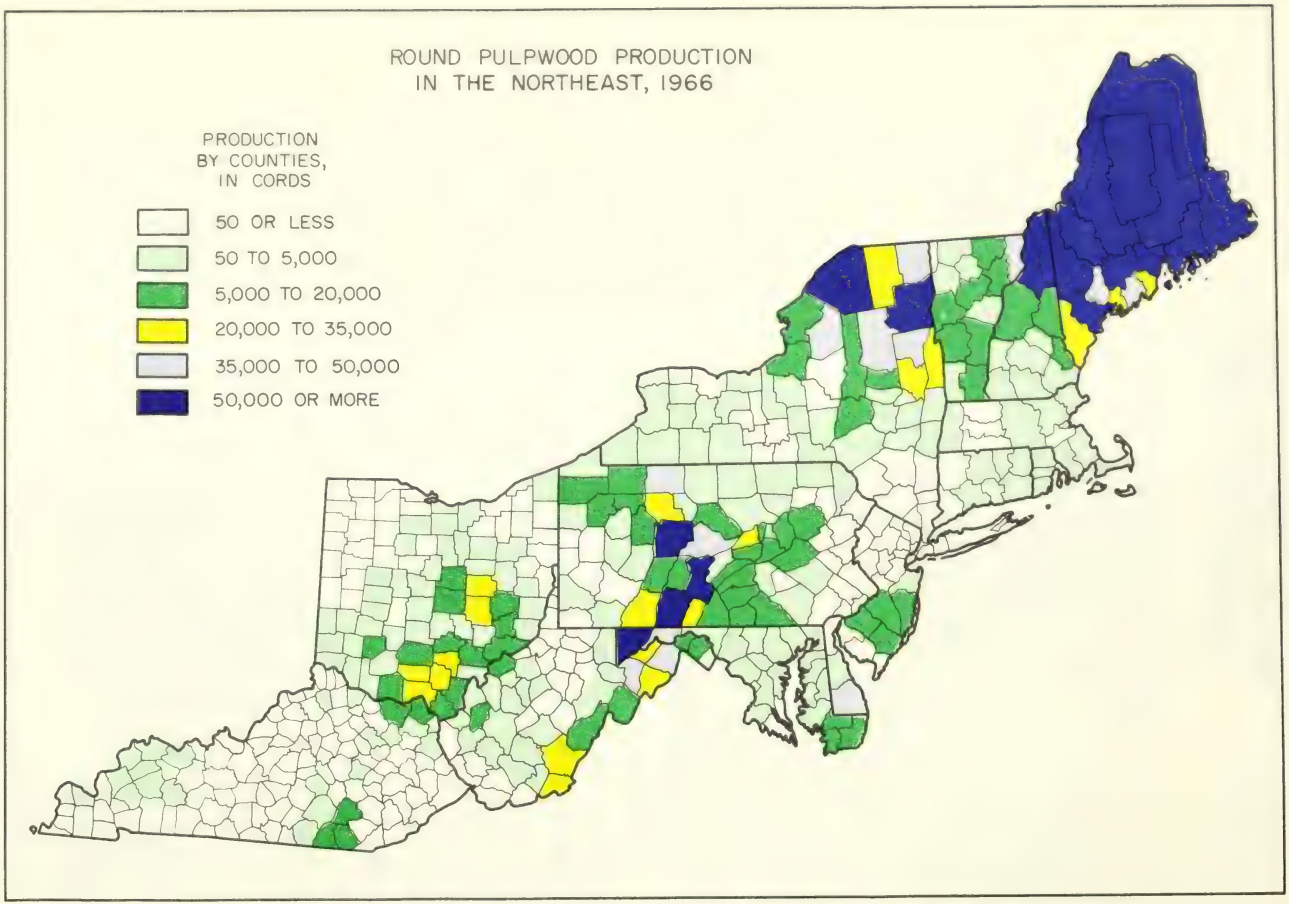

Figure 2. — The geographical pattern of round pulpwood production in the Northeast in 1966.

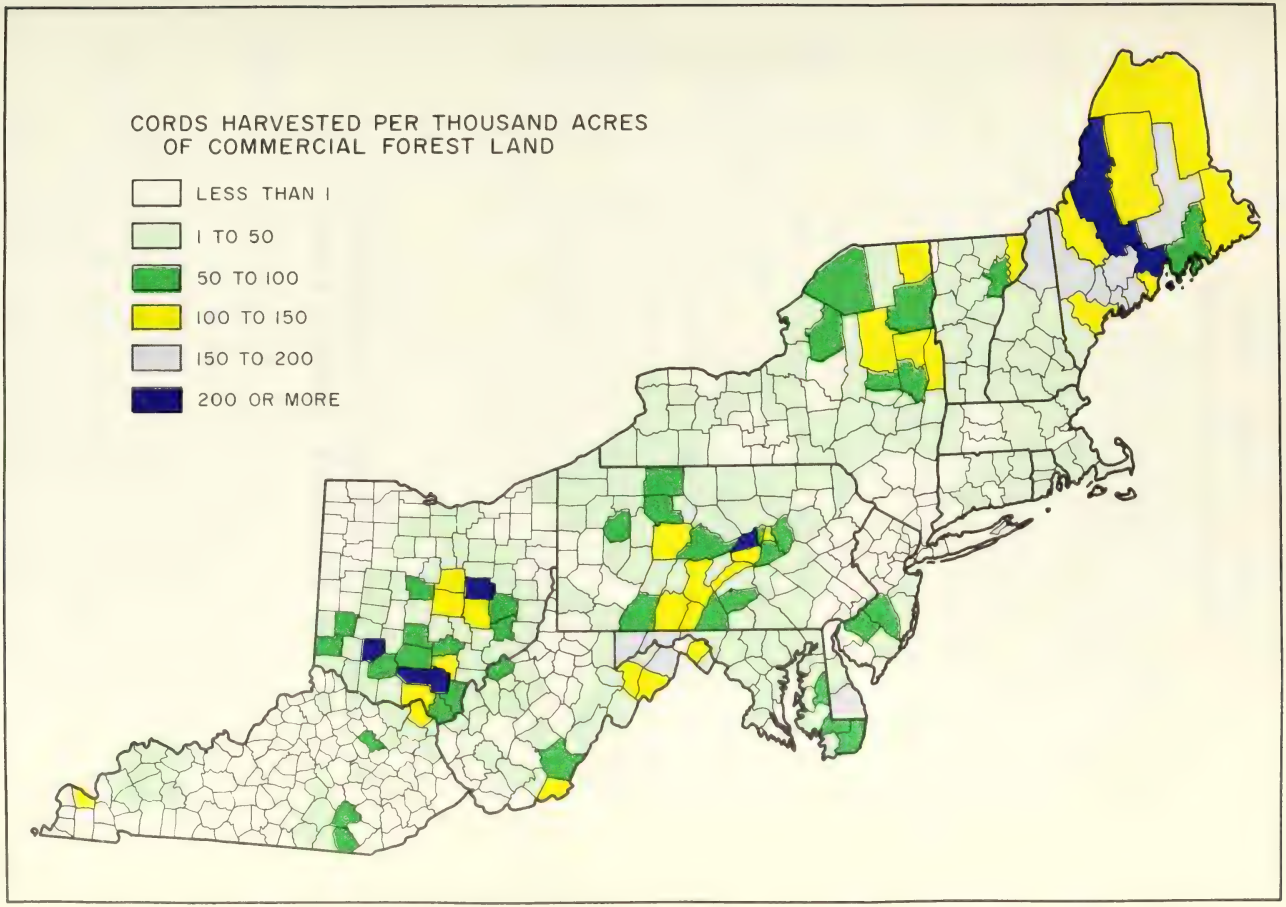

Figure 3. — The intensity of the round pulpwood harvest by counties in the Northeast, 1966.

UPWARD TREND IN WOOD CHIP PRODUCTION SLOWS

The production of pulpwood chips, which are produced primarily from sawmill slabs and edgings, gained only 7 percent over last year. By comparison, pulpwood chip production in 1965 was about one-fourth greater than in 1964. In 1966 the Northeast produced the equivalent of 557,700 cords of wood chips, compared with 522,000 cords in 1965. Softwood chip production in the region declined slightly—4 percent, while hardwood chip production rose 14 percent from the 1965 totals.

Of the 11 states that produced pulpwood chips in 1966, six showed increases over their 1965 production and five showed declines. The largest increase occurred in Kentucky where wood chip production rose from 9,800 cords in 1965 to 27,400 in 1966—a gain of 180 percent. Pennsylvania replaced West Virginia as the second largest chip producer by raising its total output by 18,400 cords to 83,100—a gain of 28 percent. West Virginia's production dropped 17 percent—16,000 cords from 1965. Vermont showed the largest decline in production: here production dropped 51 percent—18,400 cords—from the 1965 total to 17,600 cords in 1966.

USE OF OTHER BYPRODUCTS UP SHARPLY FROM 1965

The use of other wood-industry byproducts totaled 20,400 cords in 1966 compared to 10,300 cords in 1965.

Most of this increase took place in Maine and New York. Maine produced 14,900 cords in 1966 compared with 5,100 cords in 1965. New York, which produced only 700 cords in 1965, produced 3,000 in 1966.

■

Table 1. — Total production of all forms of pulpwood in the Northeast, by state, 1966

(In thousand rough cords[1])

State	Total roundwood	Total chips	Total all other	Total all forms
Connecticut	8.4	—	—	8.4
Delaware	44.3	—	—	44.3
Kentucky	86.6	27.4	—	114.0
Maine	2,767.6	148.5	14.9	2,931.0
Maryland	153.1	46.9	—	200.0
Massachusetts	11.0	5.7	—	16.7
New Hampshire	223.2	61.7	—	284.9
New Jersey	43.5	.3	.3	44.1
New York	439.0	51.3	3.0	493.3
Ohio	336.7	38.8	—	375.5
Pennsylvania	627.6	83.1	.7	711.4
Rhode Island	2.7	—	—	2.7
Vermont	126.0	17.6	1.5	145.1
West Virginia	289.9	76.4	—	366.3
Total	5,159.6	557.7	20.4	5,737.7

[1] 128 cubic feet of wood, bark, and airspace.

Table 2. — Total production and receipts of all forms of pulpwood in the Northeast, by state, and total production as a percent of total receipts, 1966

State	Total production of all forms of pulpwood	Total receipts of all forms of pulpwood	Total production as a percent of total receipts
	Thousand rough cords		*Percent*
Connecticut	8.4	(D)	(D)
Delaware	44.3	—	—
Kentucky	114.0	—	—
Maine	2,931.0	3,105.4	94
Maryland	200.0	(D)	(D)
Massachusetts	16.7	(D)	(D)
New Hampshire	284.9	415.1	69
New Jersey	44.1	60.1	73
New York	493.3	748.5	66
Ohio	375.5	482.8	78
Pennsylvania	711.4	823.5	86
Rhode Island	2.7	(D)	(D)
Vermont	145.1	(D)	(D)
West Virginia	366.3	—	—
All states	5,737.7	6,070.7	95

(D) Withheld to avoid disclosing data for individual mills.

Table 3. — Round pulpwood production in the Northeast by states and species groups, 1966

(In thousand rough cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Connecticut	—	—	6.1	6.1	—	0.9	1.4	2.3	8.4
Delaware	—	—	40.8	40.8	0.1	.3	3.1	3.5	44.3
Kentucky	—	—	30.1	30.1	1.3	46.6	8.6	56.5	86.6
Maine	1,720.4	258.6	123.3	2,102.3	63.5	—	601.8	665.3	2,767.6
Maryland	—	.2	63.9	64.1	.1	37.1	51.8	89.0	153.1
Massachusetts	—	—	4.9	4.9	—	.9	5.2	6.1	11.0
New Hampshire	96.7	9.3	6.8	112.8	2.4	—	108.0	110.4	223.2
New Jersey	—	—	34.9	34.9	—	7.7	.9	8.6	43.5
New York	73.7	4.4	45.2	123.3	21.7	12.4	281.6	315.7	439.0
Ohio	—	—	10.4	10.4	6.6	181.7	138.0	326.3	336.7
Pennsylvania	—	8.3	65.5	73.8	.4	260.6	292.8	553.8	627.6
Rhode Island	—	—	1.6	1.6	—	.8	.3	1.1	2.7
Vermont	91.3	2.6	3.2	97.1	1.6	.3	27.0	28.9	126.0
West Virginia	.7	.8	83.0	84.5	—	109.9	95.5	205.4	289.9
Total	1,982.8	284.2	519.7	2,786.7	97.7	659.2	1,616.0	2,372.9	5,159.6

Table 4. — Round pulpwood production and receipts in the Northeast, by state and destination and source of wood, 1966

(In thousand rough cords)

State	Total production (2+3+4)	Produced within the state			Received from other states or provinces		Total received (4+5+6)
		Shipped to other states in Northeast	Shipped outside the Northeast	Received within the state	In the Northeast	Outside the Northeast	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Connecticut	8.4	(D)	—	(D)	—	—	(D)
Delaware	44.3	27.9	16.4	—	—	—	—
Kentucky	86.6	39.8	46.8	—	—	—	—
Maine	2,767.6	65.9	2.0	2,699.7	16.7	193.1	2,909.5
Maryland	153.1	22.7	38.9	91.5	(D)	(D)	(D)
Massachusetts	11.0	7.6	—	3.4	(D)	—	(D)
New Hampshire	223.2	34.4	—	188.8	117.0	54.4	360.2
New Jersey	43.5	.4	—	43.1	—	—	43.1
New York	439.0	1.3	21.5	416.2	75.1	194.1	685.4
Ohio	336.7	10.8	—	325.9	35.8	8.3	370.0
Pennsylvania	627.6	53.0	—	574.6	88.2	31.2	694.0
Rhode Island	2.7	—	—	2.7	(D)	—	(D)
Vermont	126.0	(D)	—	(D)	—	—	(D)
West Virginia	289.9	221.2	68.7	—	—	—	—
Total	5,159.6	599.9	194.3	4,365.4	599.9	523.5	5,488.8

(D) Withheld to avoid disclosing data for individual mills.

Table 5. — Pulpwood chip production in the Northeast, by state and destination and by softwood and hardwood, 1966[1]

(In thousand rough cord equivalents)

State[2]	Total production			Received in state			Received out of state			
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Receiving state
Kentucky	—	27.4	27.4	—	—	—	—	6.6	6.6	Ohio
							—	18.3	18.3	Tennessee
							—	2.5	2.5	Virginia
Maine	120.7	27.8	148.5	114.0	26.9	140.9	6.7	.9	7.6	New Hampshire
Maryland	23.5	23.4	46.9	.8	2.4	3.2	9.7	6.7	16.4	New Jersey
							13.0	14.3	27.3	Pennsylvania
Massachusetts	(*)	5.7	5.7	—	—	—	(*)	5.7	5.7	New York
New Hampshire	47.7	14.0	61.7	28.9	11.9	40.8	18.8	2.1	20.9	Maine
New Jersey	—	.3	.3	—	.3	.3	—	—	—	
New York	1.7	49.6	51.3	1.7	33.6	35.3	(*)	8.4	8.4	Pennsylvania
							—	7.6	7.6	Ontario, Canada
Ohio	—	38.8	38.8	—	38.8	38.8	—	—	—	
Pennsylvania	3.2	79.9	83.1	3.2	79.7	82.9	—	.2	.2	New York
Vermont	3.7	13.9	17.6	—	—	—	2.5	—	2.5	Maine
							.7	1.2	1.9	New Hampshire
							.5	12.7	13.2	New York
West Virginia	2.2	74.2	76.4	—	—	—	.9	10.3	11.2	Maryland
							—	58.9	58.9	Ohio
							—	.4	.4	Pennsylvania
							—	.1	.1	Tennessee
							1.3	4.5	5.8	Virginia
Total	202.7	355.0	557.7	148.6	193.6	342.2	54.1	161.4	215.5	

* Less than 50 cords.

[1] The data presented in this table are for pulpwood chips produced, by state. They do not represent the source of raw material for chipping plants; nor do they include wood chips not used in the manufacture of woodpulp.

[2] States with no production are omitted.

Table 6. Pulpwood chip production and receipts in the Northeast, by state and destination and source of wood, 1966

(In thousand rough cord equivalents)

State	Total production (2+3+4)	Produced within the state			Received from other states or provinces		Total received (4+5+6)
		Shipped to other states in Northeast	Shipped outside the Northeast	Received within the state	In the Northeast	Outside the Northeast	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Connecticut	—	—	—	—	—	—	—
Delaware	—	—	—	—	—	—	—
Kentucky	27.4	6.6	20.8	—	—	—	—
Maine	148.5	7.6	—	140.9	23.4	16.7	181.0
Maryland	46.9	43.7	—	3.2	(D)	(D)	(D)
Massachusetts	5.7	(D)	(D)	—	—	—	(D)
New Hampshire	61.7	20.9	—	40.8	9.5	4.6	54.9
New Jersey	.3	—	—	.3	16.4	—	16.7
New York	51.3	8.4	7.6	35.3	19.1	6.4	60.8
Ohio	38.8	—	—	38.8	65.5	8.5	112.8
Pennsylvania	83.1	.2	—	82.9	36.1	1.3	120.3
Rhode Island	—	—	—	—	—	—	—
Vermont	17.6	17.6	—	—	—	—	—
West Virginia	76.4	70.5	5.9	—	—	—	—
Total	557.7	181.2	34.3	342.2	181.2	38.1	561.5

(D) Withheld to avoid disclosing data for individual mills.

Table 7. Miscellaneous wood industry byproducts used in woodpulp manufacture by state and destination and by softwood and hardwood, 1966[1]

(In thousand rough cord equivalents)

State[2]	Total Production			Received in state			Received out of state			
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Receiving state
Maine	14.1	0.8	14.9	14.1	0.8	14.9	—	—	—	—
Maryland	—	(*)	(*)	—	—	—	—	(*)	(*)	Pennsylvania
New Jersey	.1	.2	.3	.1	.2	.3	—	—	—	—
New York	—	3.0	3.0	—	.8	.8	—	2.2	2.2	Pennsylvania
Pennsylvania	—	.7	.7	—	.7	.7	—	—	—	—
Vermont	—	1.5	1.5	—	—	—	—	1.5	1.5	New York
Total	14.2	6.2	20.4	14.2	2.5	16.7	—	3.7	3.7	

[1] Miscellaneous wood industry byproducts includes any wood received by woodpulp mill that is not roundwood or wood chips. Examples are veneer cores, post and pole trimmings, and unchipped slabs and edgings.

[2] States with no production are omitted.

* Less than 50 cords.

Table 8. Round pulpwood production in Connecticut by counties and species groups, 1966
(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Fairfield	—	—	—	—	—	—	—	—	—
Hartford	—	—	1.6	1.6	—	—	—	—	1.6
Litchfield	—	—	—	—	—	—	—	—	—
Middlesex	—	—	—	—	—	—	—	—	—
New Haven	—	—	3.3	3.3	—	—	—	—	3.3
New London	—	—	.3	.3	—	0.1	0.9	1.0	1.3
Tolland	—	—	.1	.1	—	.1	—	.1	.2
Windham	—	—	.8	.8	—	.7	.5	1.2	2.0
Total	—	—	6.1	6.1	—	0.9	1.4	2.3	8.4

Table 9. Round pulpwood production in Delaware by counties and species groups, 1966
(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Kent	—	—	2.3	2.3	—	—	0.1	0.1	2.4
New Castle	—	—	—	—	—	—	—	—	—
Sussex	—	—	38.5	38.5	0.1	0.3	3.0	3.4	41.9
Total	—	—	40.8	40.8	0.1	0.3	3.1	3.5	44.3

Table 10. Round pulpwood production in Kentucky by counties and species groups, 1966
(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Bath	—	—	1.9	1.9	—	1.6	—	1.6	3.5
Boyd	—	—	.3	.3	—	.4	—	.4	.7
Bracken	—	—	—	—	—	—	0.1	.1	.1
Caldwell	—	—	—	—	0.1	—	.3	.4	.4
Carter	—	—	.7	.7	—	3.5	.5	4.0	4.7
Crittenden	—	—	—	—	.1	—	.3	.4	.4
Daviess	—	—	—	—	(*)	.1	.1	.2	.2
Estill	—	—	.3	.3	—	—	—	—	.3
Gallatin	—	—	—	—	—	—	(*)	(*)	(*)
Grant	—	—	—	—	—	—	.1	.1	.1
Greenup	—	—	—	—	—	16.6	.1	16.7	16.7
Henderson	—	—	—	—	.1	.1	.2	.4	.4
Hopkins	—	—	—	—	.3	.9	1.5	2.7	2.7
Kenton	—	—	—	—	—	—	(*)	(*)	(*)
Laurel	—	—	7.7	7.7	(*)	3.4	.9	4.3	12.0
Lawrence	—	—	.2	.2	—	.1	—	.1	.3
Lewis	—	—	—	—	—	8.4	—	8.4	8.4
Lincoln	—	—	—	—	—	.1	.1	.2	.2
McCracken	—	—	—	—	.2	2.7	.9	3.8	3.8
McCreary	—	—	4.7	4.7	.1	(*)	.5	.6	5.3
Mason	—	—	(*)	(*)	—	—	—	—	(*)

Muhlenburg	—	—	—	—	.2	.1	.6	.9	.9
Pulaski	—	—	1.2	1.2	—	—	—	—	1.2
Rowan	—	—	1.9	1.9	—	2.2	.1	2.3	4.2
Union	—	—	—	—	(*)	(*)	.1	.1	.1
Wayne	—	—	1.6	1.6	—	—	—	—	1.6
Webster	—	—	—	—	.1	.1	.4	.6	.6
Whitley	—	—	9.6	9.6	.1	6.3	1.8	8.2	17.8
Total	—	—	30.1	30.1	1.3	46.6	8.6	56.5	86.6

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 11. Round pulpwood production in Maine by counties and species groups, 1966

(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Androscoggin	3.3	4.1	16.3	23.7	0.2	—	16.6	16.8	40.5
Aroostook	484.8	19.4	(*)	504.2	40.1	—	31.8	71.9	576.1
Cumberland	5.5	3.3	15.4	24.2	.1	—	28.5	28.6	52.8
Franklin	60.4	8.0	6.7	75.1	—	—	52.1	52.1	127.2
Hancock	40.7	15.2	1.8	57.7	2.4	—	12.1	14.5	72.2
Kennebec	10.6	9.8	18.5	38.9	.2	—	34.9	35.1	74.0
Knox	11.4	4.6	1.5	17.5	(*)	—	6.5	6.5	24.0
Lincoln	16.0	4.7	13.1	33.8	.1	—	12.9	13.0	46.8
Oxford	49.7	17.6	16.2	83.5	.8	—	112.2	113.0	196.5
Penobscot	207.6	68.6	3.6	279.8	4.9	—	106.4	111.3	391.1
Piscataquis	255.5	16.6	2.7	274.8	10.3	—	39.4	49.7	324.5
Sagadahoc	6.0	4.5	7.7	18.2	.2	—	9.2	9.4	27.6
Somerset	385.9	15.0	4.6	405.5	.1	—	77.6	77.7	483.2
Waldo	27.0	13.4	4.5	44.9	.6	—	35.6	36.2	81.1
Washington	155.7	53.7	.9	210.3	3.5	—	12.6	16.1	226.4
York	.3	.1	9.8	10.2	—	—	13.4	13.4	23.6
Total	1,720.4	258.6	123.3	2,102.3	63.5	—	601.8[1]	665.3	2,767.6

[1] Total includes 39 thousand cords of oak.

Table 12. Round pulpwood production in Maryland by counties and species groups, 1966
(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Allegany	—	0.1	4.6	4.7	—	13.1	18.9	32.0	36.7
Anne Arundel	—	—	2.0	2.0	—	.1	—	.1	2.1
Baltimore	—	—	(*)	(*)	—	.1	.1	.2	.2
Calvert	—	—	(*)	(*)	—	—	—	—	(*)
Caroline	—	—	3.9	3.9	—	.4	—	.4	4.3
Carroll	—	—	(*)	(*)	—	.2	.1	.3	.3
Cecil	—	—	(*)	(*)	—	.2	.2	.4	.4
Charles	—	—	3.8	3.8	—	—	.1	.1	3.9
Dorchester	—	—	4.4	4.4	—	(*)	.1	.1	4.5
Frederick	—	(*)	.9	.9	—	.1	(*)	.1	1.0
Garrett	—	.1	1.6	1.7	—	20.6	31.0	51.6	53.3
Harford	—	—	—	—	—	.1	.1	.2	.2
Howard	—	—	.1	.1	—	(*)	—	(*)	.1
Kent	—	—	.2	.2	—	(*)	(*)	(*)	.2
Montgomery	—	(*)	.3	.3	—	—	—	—	.3
Prince Georges	—	—	3.9	3.9	—	.1	.2	.3	4.2
Queen Annes	—	—	.5	.5	—	—	—	—	.5
St. Marys	—	—	—	—	—	—	—	—	—
Somerset	—	—	16.2	16.2	0.1	—	.1	.2	16.4
Talbot	—	—	.1	.1	—	—	—	—	.1
Washington	—	—	.7	.7	—	1.8	.6	2.4	3.1
Wicomico	—	—	8.7	8.7	(*)	.3	.2	.5	9.2
Worcester	—	—	12.0	12.0	(*)	—	.1	.1	12.1
Total	—	0.2	63.9	64.1	0.1	37.1	51.8	89.0	153.1

* Less than 50 cords.

Table 13. Round pulpwood production in Massachusetts by counties and species groups, 1966

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Barnstable	—	—	0.1	0.1	—	—	—	—	0.1
Berkshire	—	—	—	—	—	0.2	1.0	1.2	1.2
Bristol	—	—	1.1	1.1	—	.2	.2	.4	1.5
Essex	—	—	—	—	—	—	1.6	1.6	1.6
Hampshire	—	—	—	—	—	—	(*)	(*)	(*)
Middlesex	—	—	—	—	—	—	.3	.3	.3
Plymouth	—	—	3.6	3.6	—	.5	.6	1.1	4.7
Worcester	—	—	.1	.1	—	—	1.5	1.5	1.6
Total	—	—	4.9	4.9	—	0.9	5.2	6.1	11.0

[1] Counties with no production omitted.

* Less than 50 cords.

Table 14. Round pulpwood production in New Hampshire by counties and species group, 1966

(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Belknap	—	0.2	0.3	0.5	—	—	0.9	0.9	1.4
Carroll	0.4	.2	1.3	1.9	—	—	10.0	10.0	11.9
Cheshire	—	—	.1	.1	—	—	.6	.6	.7
Coos	88.3	7.1	2.8	98.2	2.3	—	83.9	86.2	184.4
Grafton	7.6	1.8	2.0	11.4	.1	—	5.0	5.1	16.5
Hillsboro	—	—	—	—	—	—	.8	.8	.8
Merrimack	.1	(*)	.2	.3	—	—	.7	.7	1.0
Rockingham	—	—	—	—	—	—	.8	.8	.8
Strafford	(*)	—	(*)	(*)	—	—	5.3	5.3	5.3
Sullivan	.3	—	.1	.4	—	—	(*)	(*)	.4
Total	96.7	9.3	6.8	112.8	2.4	—	108.0	110.4	223.2

* Less than 50 cords.

Table 15. Round pulpwood production in New Jersey by counties and species groups, 1966
(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Atlantic	—	—	6.6	6.6	—	—	0.4	0.4	7.0
Burlington	—	—	12.3	12.3	—	3.9	.4	4.3	16.6
Camden	—	—	4.2	4.2	—	1.3	.1	1.4	5.6
Gloucester	—	—	3.5	3.5	—	2.5	—	2.5	6.0
Monmouth	—	—	.4	.4	—	—	—	—	.4
Ocean	—	—	7.9	7.9	—	—	—	—	7.9
Total	—	—	34.9	34.9	—	7.7	0.9	8.6	43.5

[1] Counties with no production are omitted.

Table 16. Round pulpwood production in New York by counties and species groups, 1966
(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Albany	—	—	—	—	0.3	0.1	0.9	1.3	1.3
Allegany	—	—	0.3	0.3	—	—	.6	.6	.9
Broome	—	—	—	—	—	(*)	1.9	1.9	1.9
Cattaraugus	—	—	—	—	1.4	—	2.4	3.8	3.8
Cayuga	0.1	—	.1	.2	—	—	—	—	.2
Chautauqua	—	—	.1	.1	.7	—	1.5	2.2	2.3
Chenango	.5	—	.6	1.1	—	—	.4	.4	1.5
Clinton	8.6	0.4	8.1	17.1	2.6	—	19.7	22.3	39.4

Chenango	.2	0.1	.1	12.1	.2	.2	1.2	1.3	1.5
Cortland	(*)	—	.4	.4	—	—	—	—	.4
Delaware	.3	—	1.5	1.8	(*)	.1	2.6	2.7	4.5
Erie	—	—	—	—	—	—	.7	.7	.7
Essex	6.2	—	2.0	8.2	.6	(*)	41.9	42.5	50.7
Franklin	17.6	.4	.8	18.8	2.4	—	4.6	7.0	25.8
Fulton	.9	—	—	.9	.6	1.6	12.4	14.6	15.5
Genesee	—	—	—	—	—	—	.6	.6	.6
Greene	(*)	—	—	(*)	—	.1	.4	.5	.5
Hamilton	8.5	—	—	8.5	2.6	.7	33.2	36.5	45.0
Herkimer	1.3	.2	.2	1.7	(*)	(*)	4.8	4.8	6.5
Jefferson	.2	.4	3.1	3.7	.3	—	3.0	3.3	7.0
Lewis	5.9	1.0	6.2	13.1	1.2	—	23.6	24.8	37.9
Livingston	—	—	.2	.2	—	—	—	—	.2
Montgomery	(*)	(*)	—	(*)	—	.2	1.0	1.2	1.2
Niagara	—	—	—	—	—	—	.8	.8	.8
Onondaga	.1	.1	2.3	2.5	.1	—	2.0	2.1	4.6
Ontario	—	—	.2	.2	—	—	—	—	.2
Orleans	—	—	—	—	—	—	(*)	(*)	(*)
Oswego	.1	.4	.3	.8	(*)	—	9.4	9.4	10.2
Otsego	.3	—	9.5	9.8	—	.4	3.1	3.5	13.3
Rensselear	—	—	—	—	—	1.0	7.0	8.0	8.0
St. Lawrence	22.0	1.5	7.6	31.1	5.5	—	17.2	22.7	53.8
Saratoga	.3	—	1.6	1.9	1.2	2.0	19.9	23.1	25.0
Schenectady	(*)	—	—	(*)	—	.1	1.1	1.2	1.2
Schoharie	—	—	(*)	(*)	—	.4	3.2	3.6	3.6
Schuyler	—	—	(*)	(*)	—	—	—	—	(*)
Seneca	—	—	—	—	—	—	(*)	(*)	(*)
Steuben	—	—	.1	.1	—	—	—	—	.1
Warren	.3	—	(*)	.3	1.6	3.5	35.6	40.7	41.0
Washington	.4	—	—	.4	.5	2.0	24.1	26.6	27.0
Wayne	.1	—	—	.1	(*)	—	—	(*)	.1
Wyoming	—	—	—	—	—	—	.8	.8	.8
Total	73.7	4.4	45.2	123.3	21.7	12.4	281.6	315.7	439.0

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 17. Round pulpwood production in Ohio by counties and species groups, 1966
(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Adams	—	—	—	—	0.1	5.7	0.8	6.6	6.6
Ashland	—	—	0.1	0.1	—	—	1.6	1.6	1.7
Ashtabula	—	—	—	—	—	—	.5	.5	.5
Athens	—	—	.1	.1	.5	5.0	2.4	7.9	8.0
Belmont	—	—	—	—	—	—	.1	.1	.1
Brown	—	—	(*)	(*)	.1	1.1	1.2	2.4	2.4
Butler	—	—	(*)	(*)	.1	.6	.7	1.4	1.4
Carroll	—	—	—	—	—	—	(*)	(*)	(*)
Champaign	—	—	—	—	—	—	.1	.1	.1
Clark	—	—	—	—	—	.1	.1	.2	.2
Clermont	—	—	(*)	(*)	.1	.5	1.2	1.8	1.8
Clinton	—	—	.1	.1	.9	1.7	2.9	5.5	5.6
Coshocton	—	—	—	—	—	1.1	30.0	31.1	31.1
Delaware	—	—	—	—	.1	.7	.8	1.6	1.6
Erie	—	—	—	—	(*)	.4	.4	.8	.8
Fairfield	—	—	—	—	.1	.3	.5	.9	.9
Fayette	—	—	—	—	—	.2	.1	.3	.3
Franklin	—	—	—	—	.1	.2	.2	.5	.5
Gallia	—	—	5.4	5.4	—	6.5	.3	6.8	12.2
Greene	—	—	(*)	(*)	.1	.3	.5	.9	.9
Guernsey	—	—	—	—	—	—	11.5	11.5	11.5
Hamilton	—	—	—	—	—	—	1.1	1.1	1.1
Harrison	—	—	—	—	—	—	.2	.2	.2
Highland	—	—	.1	.1	.1	4.1	.6	4.8	4.9
Hocking	—	—	—	—	1.8	13.9	2.5	18.2	18.2

Holmes	—	—	—	—	—	—	3.7	3.7	3.7
Huron	—	—	—	—	.1	.6	.7	1.4	1.4
Jackson	—	—	.7	.7	.3	30.5	.6	31.4	32.1
Knox	—	—	—	—	—	.1	5.5	5.6	5.6
Lawrence	—	—	1.0	1.0	—	18.8	.1	18.9	19.9
Licking	—	—	—	—	(*)	.2	9.4	9.6	9.6
Logan	—	—	—	—	—	—	.1	.1	.1
Lorain	—	—	—	—	—	.3	.6	.9	.9
Meigs	—	—	1.9	1.9	.1	1.1	.4	1.6	3.5
Monroe	—	—	—	—	—	—	.5	.5	.5
Montgomery	—	—	(*)	(*)	.3	.5	.7	1.5	1.5
Morgan	—	—	—	—	—	—	.2	.2	.2
Morrow	—	—	—	—	—	—	.1	.1	.1
Muskingum	—	—	—	—	—	—	20.9	20.9	20.9
Noble	—	—	—	—	—	—	9.6	9.6	9.6
Perry	—	—	—	—	.4	2.8	1.6	4.8	4.8
Pickaway	—	—	—	—	.1	.7	.2	1.0	1.0
Pike	—	—	(*)	(*)	(*)	18.9	7.7	26.6	26.6
Preble	—	—	.1	.1	(*)	.3	.4	.7	.8
Richland	—	—	—	—	—	—	.3	.3	.3
Ross	—	—	—	—	.3	13.1	.8	14.2	14.2
Scioto	—	—	.1	.1	.1	28.0	1.0	29.1	29.2
Seneca	—	—	—	—	(*)	.3	.3	.6	.6
Stark	—	—	—	—	—	—	.4	.4	.4
Tuscarawas	—	—	—	—	—	—	4.5	4.5	4 5
Union	—	—	—	—	—	—	.1	.1	.1
Vinton	—	—	(*)	(*)	.5	22.8	1.0	24.3	24.3
Warren	—	—	.1	.1	.3	.3	.5	1.1	1.2
Washington	—	—	.7	.7	—	—	5.6	5.6	6.3
Wayne	—	—	—	—	—	—	.1	.1	.1
Wyandot	—	—	—	—	—	—	.1	.1	.1
Total	—	—	10.4	10.4	6.6	181.7	138.0	326.3	336.7

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 18. Round pulpwood production in Pennsylvania by counties and species groups, 1966

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Adams	—	—	0.2	0.2	—	3.5	1.7	5.2	5.4
Armstrong	—	—	—	—	—	.2	.9	1.1	1.1
Bedford	—	0.3	10.4	10.7	0.1	19.2	26.0	45.3	56.0
Berks	—	—	.3	.3	—	—	.2	.2	.5
Blair	—	.1	1.2	1.3	(*)	2.5	3.9	6.4	7.7
Bradford	—	(*)	(*)	(*)	—	—	.8	.8	.8
Butler	—	(*)	(*)	(*)	—	—	—	—	(*)
Cambria	—	(*)	.6	.6	(*)	2.8	3.2	6.0	6.6
Cameron	—	(*)	(*)	(*)	—	.6	2.6	3.2	3.2
Centre	—	.9	2.5	3.4	—	27.5	13.5	41.0	44.4
Chester	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Clarion	—	—	(*)	(*)	—	1.1	.9	2.0	2.0
Clearfield	—	1.8	5.0	6.8	.2	44.7	26.8	71.7	78.5
Clinton	—	.2	.8	1.0	—	8.8	2.8	11.6	12.6
Columbia	—	—	2.0	2.0	—	4.9	4.6	9.5	11.5
Crawford	—	(*)	(*)	—	—	1.1	9.5	10.6	10.6
Cumberland	—	—	.8	.8	—	3.3	1.6	4.9	5.7
Dauphin	—	—	.3	.3	—	1.9	1.9	3.8	4.1
Elk	—	(*)	.6	.6	—	1.7	28.5	30.2	30.8
Erie	—	—	—	—	—	—	3.6	3.6	3.6
Fayette	—	—	(*)	(*)	—	1.7	3.0	4.7	4.7
Forest	—	—	.1	.1	—	2.3	8.1	10.4	10.5
Franklin	—	(*)	1.2	1.2	—	7.1	3.3	10.4	11.6
Fulton	—	.2	5.2	5.4	(*)	11.2	4.2	15.4	20.8

Greene	—	—	(*)	(*)	—	(*)	(*)	(*)	(*)
Huntingdon	—	3.6	13.9	17.5	.1	24.3	19.3	43.7	61.2
Indiana	—	.1	2.1	2.2	—	.7	1.0	1.7	3.9
Jefferson	—	(*)	.2	.2	—	1.4	7.8	9.2	9.4
Juniata	—	.6	3.5	4.1	(*)	11.2	3.5	14.7	18.8
Lancaster	—	—	.1	.1	—	.3	.3	.6	.7
Luzerne	—	—	1.1	1.1	—	4.7	5.7	10.4	11.5
Lycoming	—	(*)	.1	.1	—	1.3	.8	2.1	2.2
McKean	—	(*)	.3	.3	—	(*)	37.7	37.7	38.0
Mercer	—	—	—	—	—	.4	.4	.8	.8
Mifflin	—	.3	.6	.9	(*)	1.9	1.5	3.4	4.3
Montour	—	—	.5	.5	—	2.8	1.2	4.0	4.5
Northumberland	—	—	2.7	2.7	—	6.8	3.7	10.5	13.2
Perry	—	.1	2.3	2.4	(*)	4.6	1.9	6.5	8.9
Potter	—	—	(*)	(*)	—	—	3.5	3.5	3.5
Schuylkill	—	—	1.3	1.3	—	5.2	5.6	10.8	12.1
Snyder	—	(*)	2.3	2.3	—	8.7	3.2	11.9	14.2
Somerset	—	.1	1.0	1.1	—	10.0	13.2	23.2	24.3
Sullivan	—	—	.2	.2	—	—	1.7	1.7	1.9
Susquehanna	—	—	(*)	(*)	—	—	1.2	1.2	1.2
Tioga	—	(*)	.3	.3	—	—	1.9	1.9	2.2
Union	—	—	1.1	1.1	—	16.9	4.3	21.2	22.3
Venango	—	—	(*)	(*)	—	7.8	7.7	15.5	15.5
Warren	—	(*)	.1	.1	—	.9	10.1	11.0	11.1
Washington	—	—	—	—	—	—	.8	.8	.8
Wayne	—	—	—	—	—	—	1.0	1.0	1.0
Westmoreland	—	—	—	—	—	(*)	(*)	(*)	(*)
York	—	—	.6	.6	—	4.6	2.2	6.8	7.4
Total	—	8.3	65.5	73.8	0.4	260.6	292.8	553.8	627.6

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 19. Round pulpwood production in Rhode Island by counties and species groups, 1966
(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Bristol	—	—	—	—	—	—	—	—	—
Kent	—	—	0.5	0.5	—	0.5	0.1	0.6	1.1
Newport	—	—	—	—	—	—	—	—	—
Providence	—	—	.9	.9	—	.2	.1	.3	1.2
Washington	—	—	.2	.2	—	.1	.1	.2	.4
Total	—	—	1.6	1.6	—	0.8	0.3	1.1	2.7

Table 20. Round pulpwood production in Vermont by counties and species groups, 1966

(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Addison	1.9	—	—	1.9	0.1	—	3.9	4.0	5.9
Bennington	.6	—	—	.6	(*)	0.1	2.6	2.7	3.3
Caledonia	12.1	1.1	0.9	14.1	.1	—	1.3	1.4	15.5
Chittenden	.4	—	1.4	1.8	.2	—	2.3	2.5	4.3
Essex	37.4	.5	(*)	37.9	.5	—	9.0	9.5	47.4
Franklin	.9	—	—	.9	—	—	1.4	1.4	2.3
Grand Isle	—	—	—	—	—	—	—	—	—
Lamoille	4.4	—	—	4.4	—	—	—	—	4.4
Orange	.7	(*)	.1	.8	(*)	—	.1	.1	.9
Orleans	11.9	.9	.5	13.3	(*)	—	.4	.4	13.7
Rutland	1.3	—	—	1.3	.1	.2	4.4	4.7	6.0
Washington	4.6	.1	.2	4.9	(*)	—	.8	.8	5.7
Windham	8.9	—	—	8.9	.5	—	(*)	.5	9.4
Windsor	6.2	(*)	.1	6.3	.1	(*)	.8	.9	7.2
Total	91.3	2.6	3.2	97.1	1.6	0.3	27.0	28.9	126.0

* Less than 50 cords.

Table 21. Round pulpwood production in West Virginia by counties and species groups, 1966

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwood	Total	
Berkeley	—	—	8.0	8.0	—	3.4	0.9	4.3	12.3
Boone	—	—	.1	.1	—	.2	.2	.4	.5
Braxton	—	—	(*)	(*)	—	—	—	—	(*)
Cabell	(*)	(*)	.5	.5	—	—	—	—	.5
Calhoun	(*)	(*)	.3	.3	—	(*)	(*)	(*)	.3
Doddridge	—	—	(*)	(*)	—	(*)	(*)	(*)	(*)
Fayette	—	—	(*)	(*)	—	.1	.1	.2	.2
Gilmer	—	(*)	.1	.1	—	(*)	(*)	(*)	.1
Grant	(*)	(*)	5.4	5.4	—	17.5	17.4	34.9	40.3
Greenbrier	—	—	1.7	1.7	—	16.9	13.8	30.7	32.4
Hampshire	0.2	0.2	18.0	18.4	—	12.6	12.3	24.9	43.3
Hancock	—	—	—	—	—	(*)	(*)	(*)	(*)
Hardy	.1	.1	7.2	7.4	—	11.2	11.2	22.4	29.8
Harrison	—	—	—	—	—	(*)	(*)	(*)	(*)
Jackson	(*)	(*)	.4	.4	—	.1	.1	.2	.6
Jefferson	—	—	—	—	—	.1	—	.1	.1
Kanawha	(*)	(*)	.2	.2	—	—	—	—	.2
Lincoln	(*)	(*)	.1	.1	—	—	—	—	.1
Mason	(*)	(*)	3.7	3.7	—	.4	.1	.5	4.2
Mineral	.1	(*)	4.5	4.6	—	12.8	12.8	25.6	30.2
Monongalia	—	—	(*)	(*)	—	—	—	—	(*)
Monroe	(*)	.1	3.0	3.1	—	11.6	9.6	21.2	24.3
Morgan	—	—	8.2	8.2	—	5.5	1.2	6.7	14.9
Nicholas	(*)	(*)	.2	.2	—	.4	.4	.8	1.0

Pendleton	.1	.2	2.7	3.0	—	3.3	3.1	6.4	9.4
Pleasants	—	—	(*)	(*)	—	—	(*)	(*)	(*)
Pocahontas	(*)	(*)	1.9	1.9	—	6.3	5.5	11.8	13.7
Preston	—	—	(*)	(*)	—	1.9	1.7	3.6	3.6
Putnam	.1	.1	6.0	6.2	—	—	—	—	6.2
Raleigh	—	—	(*)	(*)	—	.1	.1	.2	.2
Randolph	(*)	(*)	.2	.2	—	1.2	1.2	2.4	2.6
Ritchie	(*)	(*)	1.5	1.5	—	.1	.1	.2	1.7
Roane	(*)	(*)	.4	.4	—	.7	.3	1.0	1.4
Summers	—	(*)	.2	.2	—	.5	.4	.9	1.1
Tucker	(*)	(*)	.1	.1	—	2.0	2.0	4.0	4.1
Wayne	—	—	(*)	(*)	—	(*)	(*)	(*)	(*)
Webster	—	—	—	—	—	(*)	(*)	(*)	(*)
Wirt	(*)	(*)	1.6	1.6	—	.8	.5	1.3	2.9
Wood	.1	.1	6.8	7.0	—	.2	.5	.7	7.7
Total	0.7	0.8	83.0	84.5	—	109.9	95.5	205.4	289.9

[1] Counties with no production are omitted.

* Less than 50 cords.

THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, foliage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

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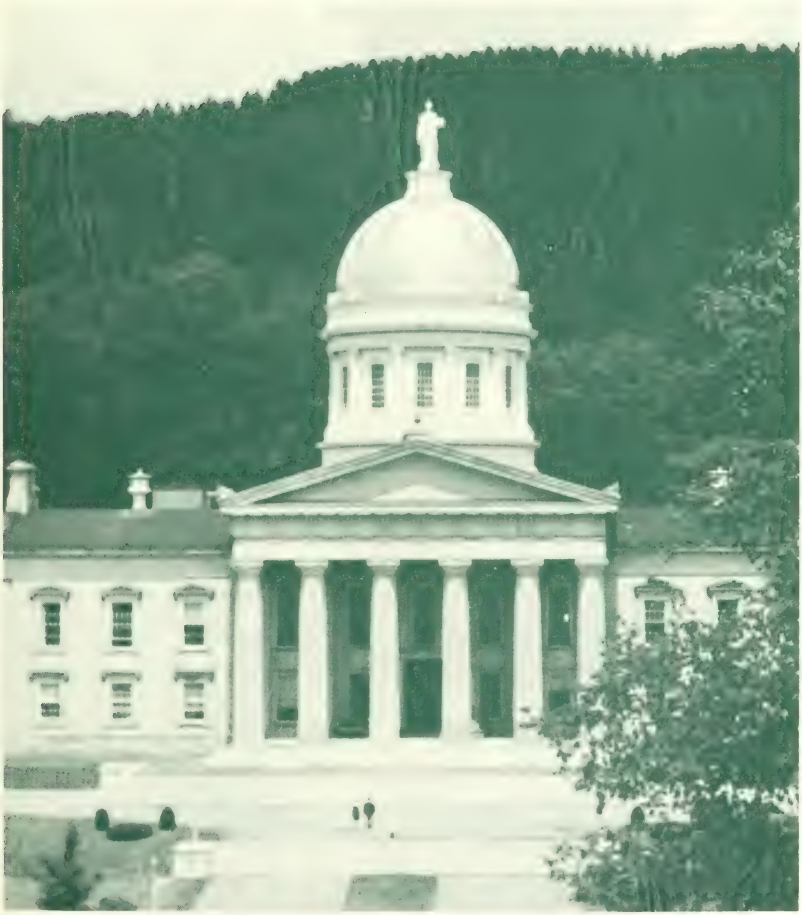
The TIMBER RESOURCES of VERMONT



U. S. FOREST SERVICE RESOURCE BULLETIN NE-12
1968

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

FOREWORD

UNDER the authority of the McSweeney-McNary Forest Research Act of May 22, 1928, and subsequent amendments, the Forest Service, U. S. Department of Agriculture, conducts a series of continuing forest surveys of all states to provide up-to-date information about the forest resources of the Nation.

A resurvey of the timber resources in Vermont was made in 1965 and 1966 by the Northeastern Forest Experiment Station, approximately 18 years after the initial forest survey.

In this resurvey, as in the initial survey, the Northeastern Station received cooperation from the Vermont Department of Forests and Parks. The Department purchased the aerial photographs of the entire state that were used for the resurvey and gathered information on the output of timber products. State field crews remeasured initial forest survey plots and established new plots on all State forest land.

Personnel of the Green Mountain National Forest carried out the part of the survey on National forest land.

This report summarizes the timber-resource situation and the changes that have taken place since the initial survey. Trends in the supply of timber for forest-based industries are pointed out and projections of future timber supply are made.

In this resurvey, a portion of the initial ground plots was remeasured to provide estimates of net annual timber growth and estimates of land-use change and to update the initial forest inventory volume. New ground plots were established for an independent second estimate. These two sets of estimates were weighted and combined to give the current estimates of forest area and timber volume.

Sampling errors, which indicate reliability, are shown for most of the totals of the breakdowns of the new estimates. Users of these resource data are cautioned to read carefully the definitions of terms and the section pertaining to the reliability of the estimates in the appendix.

COVER PHOTO: Vermont's State Capitol at Montpelier set against a forest background.

The TIMBER RESOURCES of VERMONT

by Neal P. Kingsley
and Joseph E. Barnard

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One of many pleasant vistas to be found in Vermont.

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Important Findings

MANY significant changes in the timber resource of Vermont have taken place since the first Forest Survey report of Vermont was published in 1948. Here briefly are some of the more important findings of the second survey—

- Commercial forest land totaled 4,295 thousand acres—73 percent of Vermont's total land area. This is an increase of 16 percent since 1948.
- Nearly 91 percent of Vermont's commercial forest land is privately owned. Forest industries own 16 percent; farmers, 32 percent; and miscellaneous private owners, 43 percent.
- The area in softwood forest types increased one-third while the area of hardwood types increased slightly. Softwood types cover 1,349 thousand acres and hardwood types cover 2,946 thousand acres.
- Sixty-seven percent of the commercial forest land is well stocked with growing-stock trees. But, only a very small proportion is well stocked with desirable trees.
- The volume of growing stock totaled 3,765 million cubic feet —up 12 percent from 1948.
- Despite an increase in total forest land area, the volume of sawtimber declined from 7.6 billion board feet in 1948 to 6.6 billion in 1966.
- Less than 40 percent of the sawtimber volume is in trees 15.0 inches d.b.h. and larger.
- Average net annual growth of growing stock was 83 million cubic feet and average annual timber cut was 61.2 million cubic feet for the 18 years between surveys.

- Average net annual growth of sawtimber was 174.7 million board feet and average annual sawtimber cut was 225.8 million board feet for the 18 years between surveys.
- The future supply of timber in Vermont looks favorable, but quality timber will continue to be scarce.
- For Vermont to realize the full potential from its timber resource, an extensive program of timber-stand improvement will be needed.

Farming vs. Lumber

Settlement and Farming

When the first settlers came to Vermont, more than 2 centuries ago, over 95 percent of the land was forested. As settlement advanced and available land became scarcer, the settlers established their self-sufficient farms on forested mountainsides.

Because these farms were literally cut out of the woods, the forest was more foe than friend. Once the land was cleared, the farmers made only moderate demands on the forest, chiefly for firewood, potash, and building material for homes and farm buildings.

This type of land-clearing continued in Vermont for over a century. By 1870 Vermont's forests had been reduced to an all-time low: sixty-eight percent of the State's land area was being used for agriculture.[1] More land had been cleared in Vermont in 150 years than had been cleared in either New Hampshire or Maine.

In the late nineteenth century, farms were abandoned in increasing numbers, particularly the hill farms, and the population shifted to urban areas and to the Western States. The reasons for this exodus from the farms are many and complex. Rural people came to demand the goods and services that could be had only in the urban areas. Young people sought, and often found, more lucrative employment in the manufacturing centers of

[1] Wilson, H. Q., THE HILL COUNTRY OF NORTHERN NEW ENGLAND. 100 pp. Columbia University Press, New York. 1936.

Only the better Vermont farms were able to survive the decline of agriculture.

southern New England and New York. The hillside farms, which were on land not well suited to agriculture, became depleted and more difficult to farm. Added to this, cheaper foodstuffs from the agriculturally rich Midwest found increasingly favorable markets in Boston and other southern New England cities. All of these factors came together to force the ever-increasing, although often reluctant, abandonment of these farms.

For a time, cattle and sheep raising provided a new source of revenue. Vermont became famous for its Merino sheep, which had been imported from Spain. However, even these attempts to continue farming failed because meat and wool produced in Vermont could not compete with the cheaper meat and wool from the West.

Between 1880 and 1966—86 years—approximately 1.7 million acres of farm land reverted to forest land. Farming in Vermont did not decline at a constant rate during those 86 years. During the depression of the 1930's and then during World War II

agriculture had a slight but short-lived revival. This was spurred first by a return to family farms by the unemployed and then by the war.

The Forest Industries

When the earliest settlers arrived in Vermont their main concern was to clear the forests to make room for cabins and farms. However, later settlers looked upon the forests as a source of livelihood, and the lumber industry in Vermont began. The word *lumber* originally meant accumulated stores of cumbrous and discarded household articles. In Vermont the word lumber was to come to mean a mainstay of the State's economy.

Burlington, which is advantageously situated on Lake Champlain, became the center of a bustling lumber industry. At first, rafts of white pine and oak were floated north to Quebec for shipment to Europe. By 1835 the supply of accessible raw material was exhausted. But extension of the railroad and completion of the canal system from the Ottawa River to Albany in the late 1840's opened new sources of supply as well as markets for lumber. By 1880 Burlington was the third largest producer of lumber in the United States. Huge quantities of lumber were produced and distributed throughout the world. Across the state, the Connecticut River was used to transport logs and lumber to the mills and markets of Massachusetts.

In 1889 Vermont reached its peak in lumber production by producing 430 million board feet. By 1920 lumber production had sunk to 200 million board feet. It did not rise above 200 million again until 1946, but then it reverted to its earlier downward slide until by 1965 lumber production had dropped to 115 million board feet.

Vermont's forests also provided spruce and fir pulpwood for the woodpulp industry that developed in the late 1800's. Bellows Falls became the center of a thriving paper industry and, to this day, still manufactures many types of specialty grade papers. Although Vermont today has only one active woodpulp mill, the 113 thousand cords of pulpwood cut in Vermont in 1965 were used by woodpulp mills in Vermont, New York, New Hampshire, and Canada.

Forest Area

Seventy-three percent of Vermont's land area today is commercial forest land[2]—a total of 4,295 acres. Of Vermont's 13 counties[3] that have commercial forest land none is less than 50 percent forested, and only three are less than 70 percent forested. Essex County, in the far northeastern corner of the State, is the most heavily forested; over 92 percent of its area is in commercial forest land. The least forested county is Franklin County, which is 50 percent covered by commercial forest. This county lies in the northwestern portion of the State in the fertile Champlain Valley.

In addition to the 4.3 million acres of commercial forest land in Vermont, there are 27 thousand acres of noncommercial forest land. Twenty thousand acres of this land are unproductive forest

[2] See appendix for definitions of this and other terms used in this report.

[3] Grand Isle County has been excluded from this timber inventory. Although the county contains approximately 10 thousand acres of forest land and does furnish some timber products, it was excluded because we felt that the recreation potential of the county's forest land far outweighed its potential for timber production.

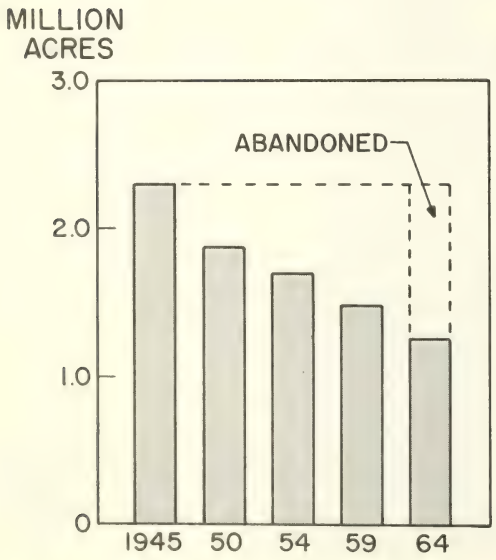
Percent of the total land area of Vermont counties that is commercial forest land.

land. This land is not capable of yielding forest products because site conditions are adverse. The remaining 7,000 acres of noncommercial forest land is productive land that has been withdrawn from timber production through ordinance, statute, or administrative order. Typical of these areas are state parks and other recreation sites.

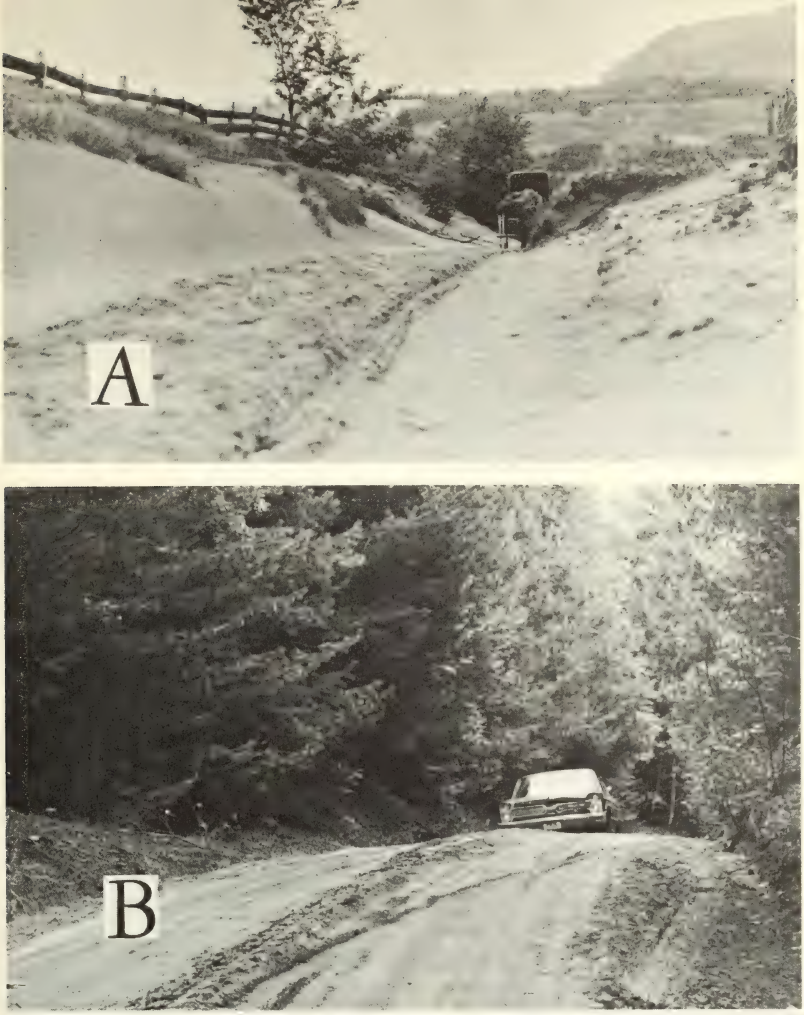
Changes in Commercial Forest Land Area

The area of commercial forest land in Vermont has increased by over ½ million acres since 1948. In 1948 the commercial forest land area of the State totaled 3,713,400 acres; by 1966 it totaled 4,294,600 acres. Undoubtedly the overriding cause of this increase in forest land was the rapid decline of farming during this period. According to the Census of Agriculture,[4] cropland and treeless pasture land in Vermont decreased by nearly 45 percent between 1945 and 1964.

[4] U. S. Department of Commerce. United States Census of Agriculture 1(3): 7. 1964.



Cropland and treeless pasture land in Vermont decreased by almost 45 percent between 1945 & 1964.



The east boundary of the Lyndon State Forest—(A) 1910 and (B) 1966. A dramatic illustration of the results of reforestation. Photo credit: Vermont Department of Forests and Parks.

The increase in commercial forest land was distributed generally throughout the State. Every county registered a significant increase. However, Orleans County showed the most outstanding increase—a gain of nearly a third in commercial forest area. Of the five geographic sampling units, the Northern Counties unit gained 18 percent in forest area. The Southern Counties unit was close behind with a 14-percent increase. Acreage of commercial forest land and the percent of change in the five geographic units are:

Geographic unit	*1948 (thousand acres)*	*1966 (thousand acres)*	*Change (per cent)*
National forest	190.8	219.9	+15
Northern counties*	1,755.8	2,072.1	+18
Southern counties	1,681.2	1,919.3	+14
State forests and parks in the northern counties	54.8	59.5	+ 9
State forests and parks in the southern counties	21.4	23.8	+11
All units	3,704.0	4,294.6	+16

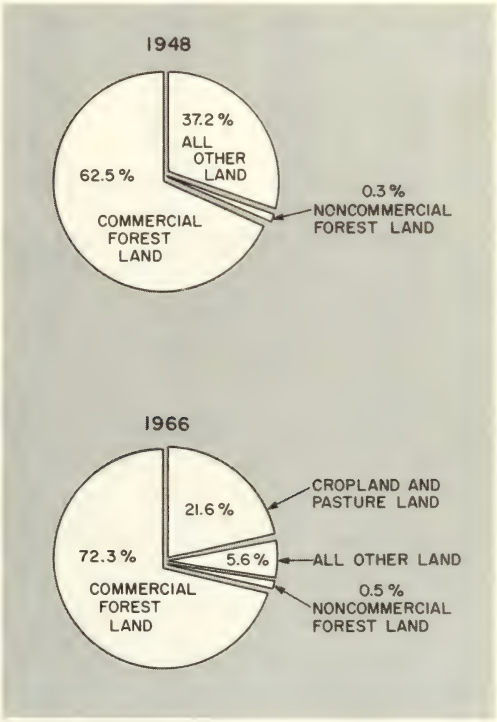
* Excluding Grand Isle County.

Geographic sampling units used for the resurvey of Vermont.

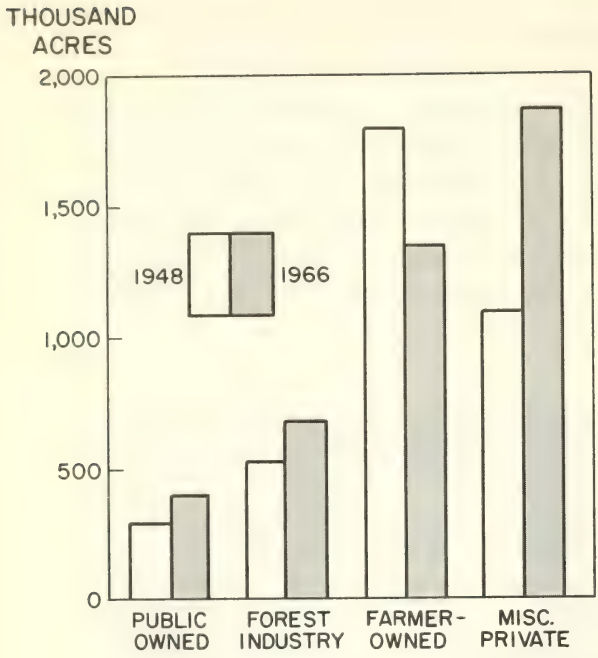
Farmers No Longer Own Most Forest Land

In 1948 farmers owned 48 percent of Vermont's commercial forest land. By 1966 commercial forest land owned by farmers had dropped to 32 percent—1,352,000 acres.

Today the most important group of forest owners are those classified as miscellaneous private owners. These are generally people whose livelihood is not connected with the forest or farming. They may be business and professional people, housewives, teachers, and the like. This group owns 43 percent of the commercial forest land in the State—a total of 1,866,000 acres. By comparison, miscellaneous private owners owned 1,087,000 acres or 29 percent of the commercial forest land in 1948.



Land use has changed substantially since 1948.



All classes of ownership increased in area except farmer-owned, which dropped by 548 thousand acres.

Although the acreage owned by forest-based industries increased by 150,000 acres from 1948 to 1966, the share of commercial forest land owned by these industries gained less than 2 percent—from little more than 14 percent to almost 16 percent. The largest share of the forest-industry land is owned by pulp and paper companies—a total of 317,000 acres. Lumber companies own 279,000 acres, and other forest industries own 82,000 acres.

Only 9 percent of the commercial forest land is publicly owned. In 1948 this ownership group held 8 percent. The largest public ownership—220,000 acres—is the Green Mountain National Forest. In addition to this the Federal Government also owns another 4,000 acres in Vermont. The State of Vermont owns 131,000 acres of commercial forest in state parks, state forests, and other holdings. The counties and the municipalities own 44,000 acres of commercial forest.

Softwood Types Gain More Area Than Hardwood Types

The increase in commercial forest land between forest surveys was not evenly distributed among the forest types. The area in softwood types increased by nearly one-third, while the area of hardwood types gained not quite one-tenth. Softwood types cover 1,349,000 acres—31 percent of the forest area. By comparison, softwood types occupied 1,044,600 acres—28 percent of the forest area in 1948. Hardwood types cover 2,946,000 acres—69 percent of the forest area of the State. In 1948 hardwood types covered 2,668,800 acres.

A typical old-growth northern hardwood stand. Northern hardwood is the most common forest type in Vermont.

A typical spruce-fir stand. Spruce-fir is the most common softwood type in Vermont.

The spruce-fir type covers 749,000 acres (17 percent of the commercial forest area). This type is composed of spruce and/or the true firs, either as pure stands or associated with white-cedar, tamarack, maple, birch, and hemlock. In Vermont this type usually is found on moist sites in the northern portion of the State and at higher elevations in the southern portion.

The white pine-red pine type occupies 600,000 acres—14 percent of the commercial forest land. This type group includes pure stands of white pine, white pine mixed with hemlock or northern hardwood, and pure and mixed stands of red pine. The type commonly is scattered throughout the State on all soils from sea level to about 2,500 feet elevation.

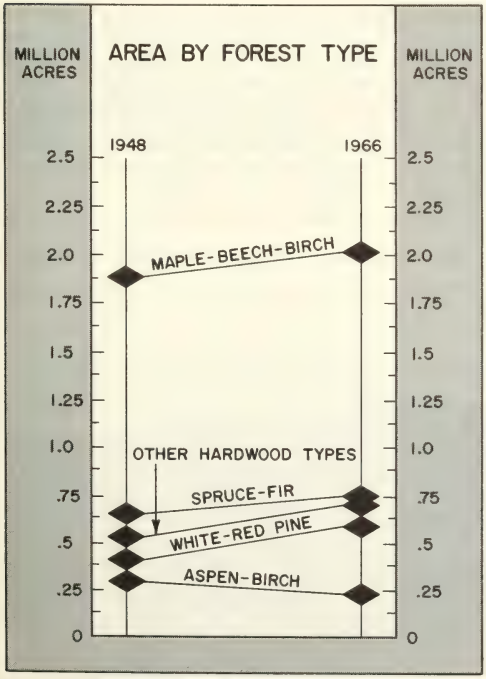
By far the most common and economically the most important forest type in Vermont is the maple-beech-birch or northern hardwood type. This type occupies 2,004,000 acres or nearly 47 percent of the State's total forest area. It is composed of stands in which maple, beech, or yellow birch together or separately com-

prise a plurality of the stocking. The sugar maple, symbolic of Vermont, is common in this type. Other species, like hemlock, white pine, basswood, and white birch, also are frequently found in this type. In general, the northern hardwoods prefer fertile and moist loamy soils. Occasionally they may be found on sandy soils.

An aesthetically and commercially important type group is the elm-ash-red maple type, which covers 555 thousand acres. This type, which frequently is found in wet areas, provides the red maple swamps and bottoms that are often bright red in the fall.

The aspen-birch type covers 249,000 acres. This type is found in scattered stands throughout Vermont, but is more common in the northern portion. Quite often this type is succeeded by the spruce-fir type.

The oak forest types are relatively unimportant in Vermont. The oak-hickory type occupies 75,000 acres and the oak-white pine type covers 63,000 acres. All of this area is in the southern portion of the State.



The increase in commercial forest land between forest surveys was not evenly distributed among the forest types.

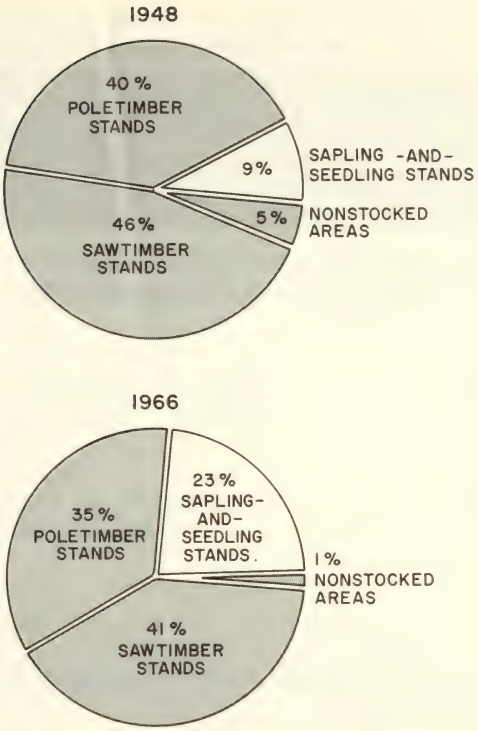
The Area in Sapling-and-Seedling Stands Increased

Although the area of sawtimber-size stands increased by 4 percent from 1948 to 1966, the percent of all commercial forest land occupied by sawtimber stands decreased from 46 percent of the area in 1948 to 41 percent in 1966.[5] Similarly the area in poletimber stands increased by 2 percent, but as a percent of all stands they decreased from 40 percent in 1948 to 35 percent in 1966.

The area in sapling-and-seedling stands increased 645,000 acres. The area of nonstocked forest land decreased by 136,000 acres. This large increase in sapling-and-seedling stands is undoubtedly due to the rapid decrease in the number of farms during the late 1940's and 1950's. Many previously nonstocked areas are now in sapling-and-seedling stands and because the decline of farming has slowed, fewer forest areas now can be classified as nonstocked.

[5] Because the method of determining stand-size class was changed between 1948 and 1966, the 1948 estimates of sawtimber and poletimber stands have been adjusted to the 1966 basis. Stand-size classes in the initial inventory (1948) were determined by volume specifications as well as by stocking (Sawtimber stands had a minimum of 1,500 net board feet per acre). In the second inventory (1966) stand sizes were determined by the plurality of stocking. If plurality of stocking had been used for the sawtimber classification on the initial survey, the area in sawtimber stands would have been approximately 5 percent less than that reported for 1948 (46 percent rather than 51 percent).

With the decline of farming, much of Vermont's farm land is reverting to forest.



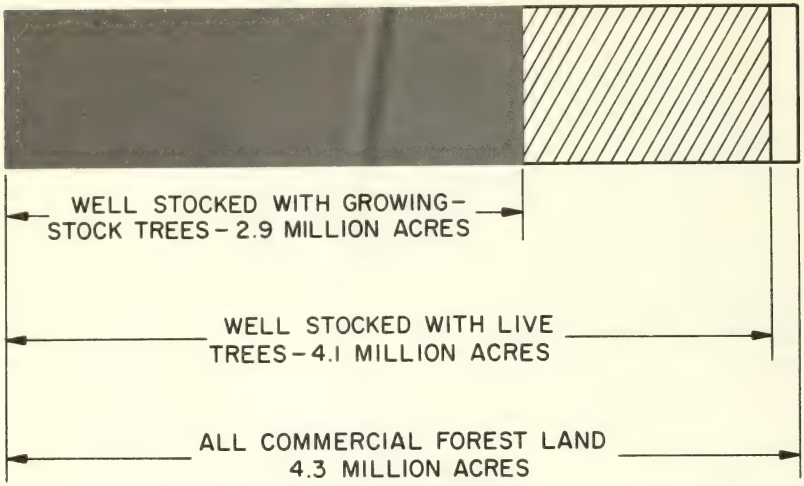
The area in sapling-and-seedling stands increased by 14 percent from 1948 to 1966.

High Proportion of Forest Land Stocked With Low-Quality Trees

In Vermont a well-stocked acre of forest land is one that contains 42 square feet or more of basal area in trees 5 inches d.b.h. and larger.[6] On this basis, if all live trees are considered, 96 percent—4.1 million acres—of the State's commercial forest land is well stocked. When rough and rotten trees are excluded and only growing-stock trees are considered, this percentage drops to 67 percent—2.9 million acres of commercial forest land. If one wishes to consider only desirable growing-stock trees (the type of trees forest managers aim to grow) only a very small propor-

[6] Forty-two square feet of basal area is 70 percent of minimum full utilization of the site, which, in Vermont, has been set at 60 square feet of basal area in trees 5 inches d.b.h. and larger. Minimum full utilization has in turn been defined as the lowest stocking level at which the growing space is fully occupied.

Only two-thirds of Vermont's commercial forest land is well stocked with growing-stock trees.


WELL STOCKED WITH GROWING-STOCK TREES - 2.9 MILLION ACRES
WELL STOCKED WITH LIVE TREES - 4.1 MILLION ACRES
ALL COMMERCIAL FOREST LAND 4.3 MILLION ACRES

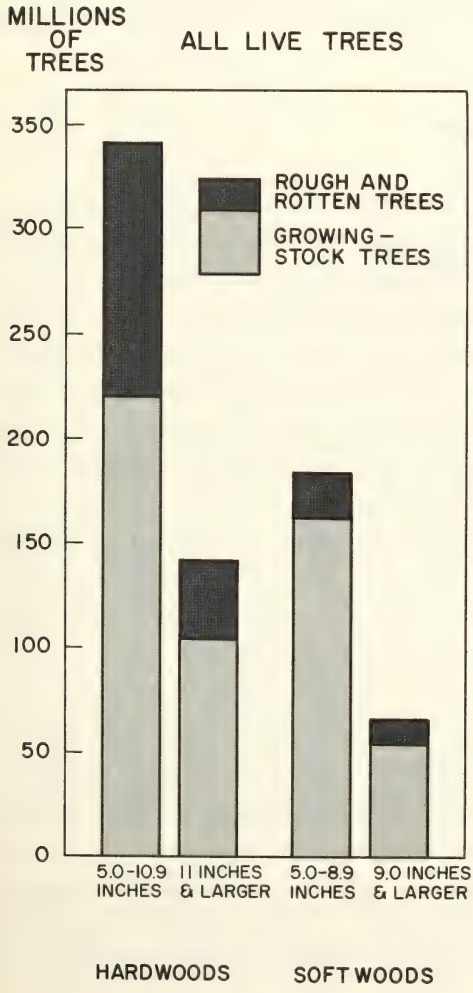
tion of Vermont's commercial forest land would be considered well stocked.

No data were compiled to show the area in softwood stands and in hardwood stands that is well stocked with growing-stock trees. However, a comparison gives an indication. On the basis of volume per acre, softwood sawtimber stands contain an average of approximately 1,500 cubic feet of growing-stock volume compared with about 1,000 cubic feet in hardwood sawtimber stands. Thus hardwood sawtimber stands contain about one-third less volume per acre than do softwood stands. For poletimber stands this comparison is about 1,400 to 800 cubic feet and for sapling-and-seedling stands 400 to 200 cubic feet. When all stand-size classes are taken together, all softwood stands average about 1,100 cubic feet per acre compared with an average of approximately 800 cubic feet per acre for hardwood stands. On the average then, hardwood stands contain about 27 percent less growing-stock volume than do softwood stands. From this comparison we can reasonably conclude that, proportionately, the area of well-stocked hardwood stands is less than the area of well-stocked softwood stands.

Timber Volume

Timber Volume Failed To Keep Pace with Increase in Forest Area

Although the area of commercial forest land increased 16 percent, the total volume of growing stock increased only 12 percent. Growing stock totaled 3,765 million cubic feet, compared



One tree in four is rough and/or rotten.

with 3,373 million cubic feet in 1948.[7] The net cubic-foot volume of softwoods increased from 1,190 million in 1948 to 1,420 million in 1966, a gain of 19 percent. Hardwood net cubic-foot volume increased 162 million feet—only 7 percent—to 2,345 million in 1966.

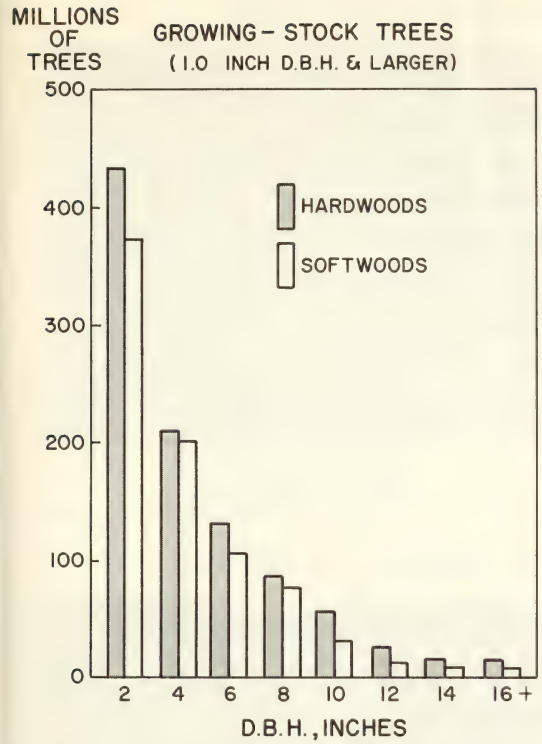
In addition to the 3,765 million cubic feet of growing stock in Vermont's forests, there is also 306 million cubic feet of sound wood volume in rough trees and 161 million feet in rotten trees. Much of this material can be used by industries that depend primarily on wood for fiber. One tree in four—26 percent—is a rough or rotten tree. Rough and rotten trees make up 32 percent of all live hardwood trees and account for 13 percent of all live softwood trees.

Sugar Maple Has Largest Growing-Stock Volume

Hardwood species make up 62 percent of Vermont's growing-stock volume—2,345 million cubic feet. The maples account for 47 percent of this hardwood volume. Sugar maple has the greatest volume of all species—hardwood and softwood—with 829 million cubic feet. This volume is 35 percent of the hardwood growing stock and 22 percent of all growing stock. The species with the second highest volume is yellow birch; 299 million cubic feet —13 percent of the hardwood. Red maple has 276 million cubic feet of growing stock and ranks third in volume.

Softwood species account for 38 percent of Vermont's growing-stock volume—1,420 million cubic feet. The spruces have the highest volume of softwoods and the second highest volume of all species. The spruces account for 496 million cubic feet of growing stock—35 percent of the softwood and 13 percent of the volume of all species. The second-ranked softwood in volume is eastern hemlock with 316 million cubic feet of growing stock. This species also ranks third in volume among all species. Eastern

[7] Because Forest Survey methods and definitions changed between 1948 and 1966, direct comparisons of volumes between surveys is not possible. Therefore, the 1948 estimates presented in this report have been adjusted to 1966 Forest Survey standards. A complete discussion of these differences is presented in the appendix.

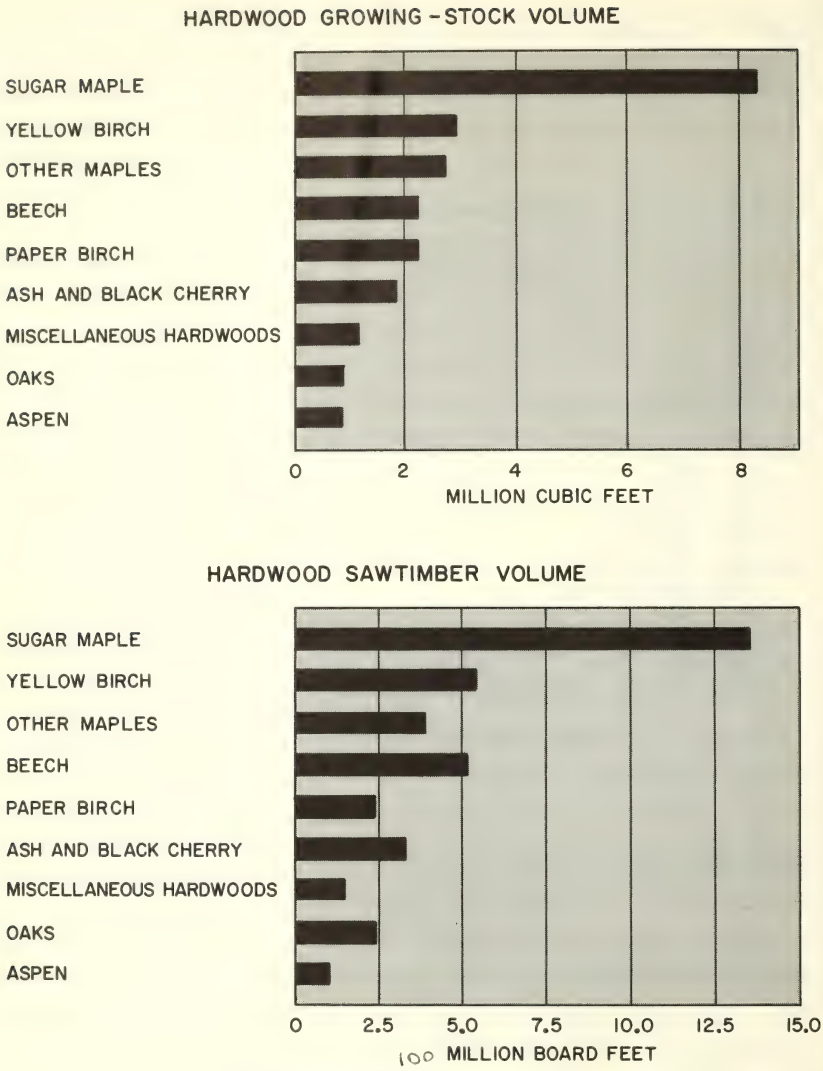


The number of hardwoods exceeds the number of softwoods in every diameter class.

white pine and red pine combined ranked third[8] among the softwoods with 296 million cubic feet of growing stock.

Several changes in the ranking of species by volume of growing stock occurred between 1948 and 1966. Sugar maple, the spruces, and red maple held their ranking in abundance from 1948 to 1966: first, second, and sixth, respectively. However, hemlock rose from fifth place in 1948 to third in 1966. White and red pines went from seventh place to fifth place. Yellow birch fell from third place in 1948 to fourth in 1966. The most outstanding change occurred in the volume of beech, which fell from fourth place in 1948 to eighth position in 1966. This sudden decline is undoubtedly due primarily to the outbreak of the beech scale disease in Vermont.

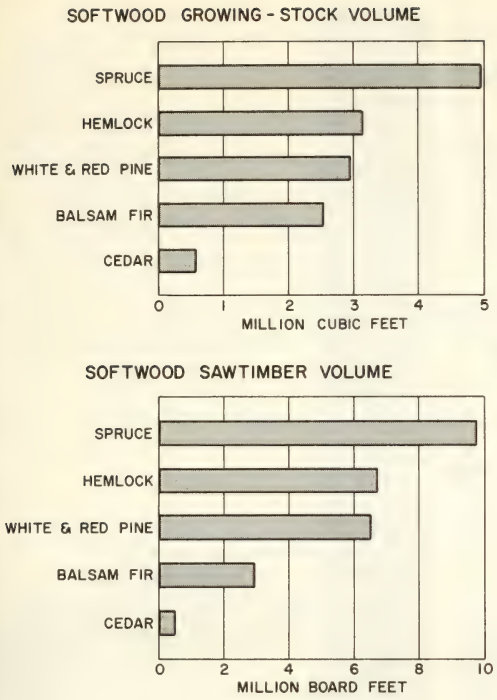
[8] This total includes about 1 percent red pine.



Hardwood volume by species.

Sawtimber Volume Declines

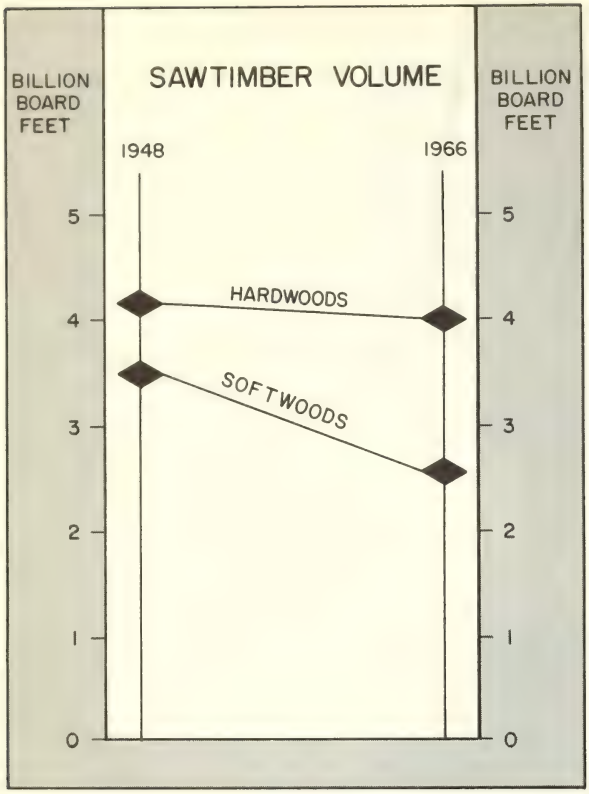
The volume of sawtimber in Vermont declined 13 percent between 1948 and 1966. In 1948 sawtimber volume totaled 7.6 billion board feet, but by 1966 it had fallen to 6.6 billion feet. This change is the result of a substantial decline in softwood



Softwood volume by species

volume coupled with a slight decline in hardwood volume. Softwood sawtimber volume fell from 3.5 billion board feet in 1948 to 2.6 billion in 1966 because cutting rates were heavy during the first 10 to 12 years of the 18-year period. Cutting trends during the last 5 years indicate that this situation has been reversed and that an increase in softwood sawtimber volume can be expected. Hardwood sawtimber volume declined from 4.1 billion board feet in 1948 to 4.0 billion in 1966. Hardwood volume probably declined because the proportion of cull volume in hardwood sawtimber trees increased.

Nearly 1.4 billion board feet of Vermont's sawtimber volume is sugar maple. Thus sugar maple comprises 35 percent of the hardwood sawtimber volume and 22 percent of all sawtimber. The spruces account for over 36 percent of the softwood sawtimber volume and over 14 percent of all sawtimber volume—959 million board feet. Hemlock is the third most abundant with 673 million board feet, and white and red pine are the fourth



The trend of sawtimber volumes by species group.

most abundant with 654 million board feet. Yellow birch accounts for 597 million board feet of sawtimber. Yellow birch accounted for 15 percent of the sawtimber volume in 1948; in 1966 it accounted for only 9 percent. This decline in the volume of yellow birch sawtimber is primarily the result of heavy cutting for veneer and furniture stock.

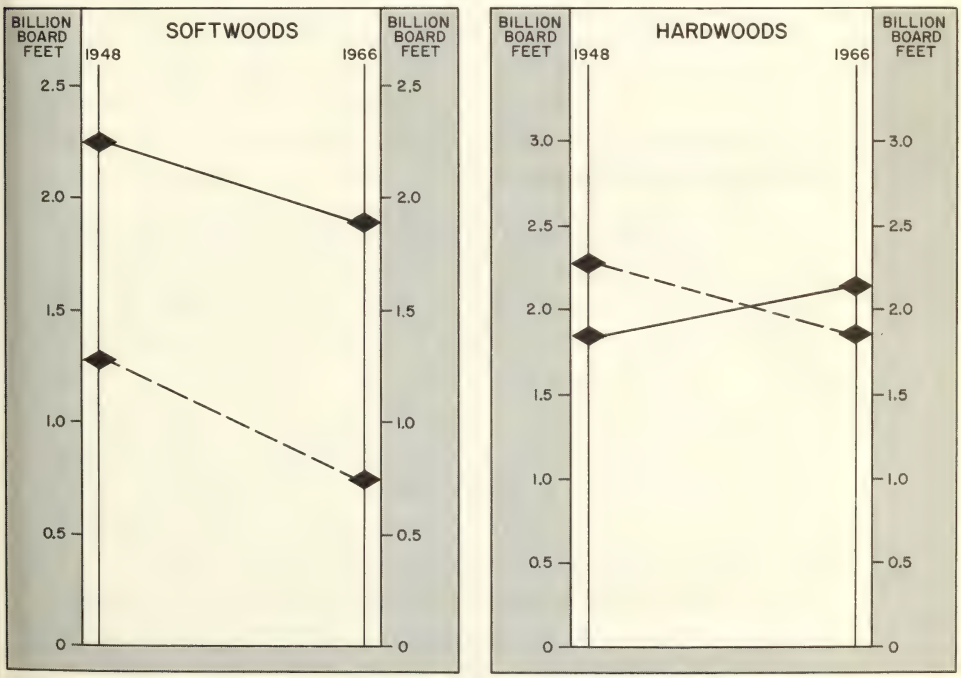
Average Diameter of Sawtimber Trees Declines

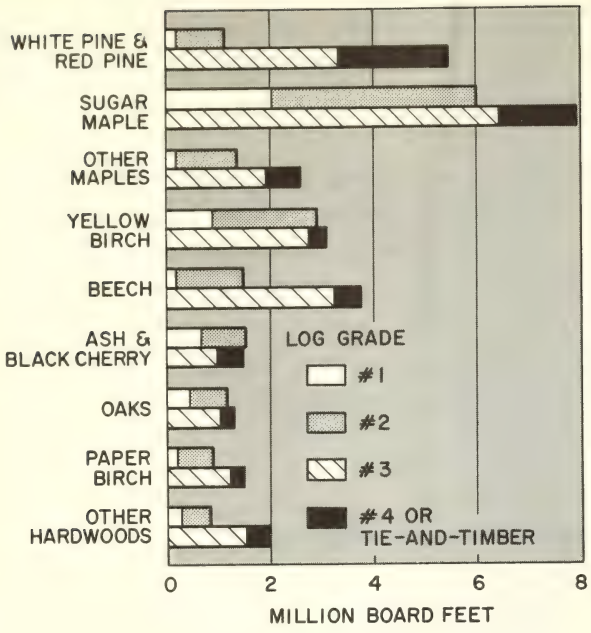
The average softwood sawtimber tree is between 13.0 and 14.9 inches d.b.h. The average hardwood sawtimber tree is between 17.0 and 18.9 inches d.b.h. However, the volume of sawtimber in large sawtimber trees (15.0 inches d.b.h. and larger) has declined both for softwoods and for hardwoods. The volume in large softwood sawtimber trees declined 42 percent between

surveys, while the volume in small sawtimber trees decreased 20 percent. The board-foot volume in small softwood sawtimber trees is now more than double that in the larger trees—1,885 to 742 million board feet.

The situation for hardwoods is less serious. Sawtimber volume in larger hardwood trees decreased 19 percent between 1948 and 1966, while the volume in small hardwood sawtimber trees increased 17 percent. In 1948 the volume in large hardwood sawtimber trees exceeded that of the small trees; however, in 1966 the volume of small hardwood sawtimber trees was 15 percent greater than the volume in large sawtimber trees.

The trend of sawtimber volumes, by species group and tree-size class.





The quality of sawtimber.

Large Volume of Low-Grade Sawtimber

The most sought after sawlogs are those that would be graded sawlog grades 1 and 2. Of the sawtimber in Vermont that was graded, only 37 percent falls in these two log grades. In only one species, ash, does the volume of grade-1-and-2 logs exceed 50 percent, and then only by one-half of 1 percent. White pine has the lowest proportion of grade-1-and-2 logs—16.8 percent. Among the hardwoods yellow birch has 49 percent of its material in the two top grades. While the percent of ash in grades 1 and 2 exceeds that of yellow birch, the volume of ash becomes insignificant when compared with the volume of yellow birch.

Only sugar maple, yellow birch, ash, and oak have 15 percent or more of their volume in grade-1 logs. All the other species have less than 10 percent in this grade.

Three percent of the white pine sawtimber is in grade-1 sawlogs; 14 percent in grade-2; 51 percent in grade-3; and 32 percent in grade-4, as indicated by the volumes shown below:

Grade	Volume (million board feet)
1	17
2	93
3	337
4	207

Twelve percent of hardwood sawtimber is in grade-1 sawlogs; 28 percent in grade-2, 48 percent in grade-3; and 11 percent in the Tie-and-timber grade, based upon the following volumes:

Grade	Volume (million board feet)
1	494
2	1,126
3	1,915
Tie-and-timber	439

Net Growth is Low

Average annual net growth, developed from the remeasurement of permanent forest-survey plots, was 2.8 percent per year for softwood growing stock and 1.9 percent per year for hardwood growing stock. For sawtimber, average annual net growth was 3.5 percent for softwoods and 2.1 percent for hardwoods.

This growth is well below the potential net annual growth of timber in Vermont. Table 8 shows that 38 percent of Vermont's commercial forest land is capable of producing 85 cubic feet per acre per year or more. This indicates that Vermont has a potential net annual growth in excess of 5 percent of the growing-stock inventory volume.

Why is growth so much lower than the potential? A look at the components of net annual growth gives the answer. Table 24 of the appendix shows that average annual mortality as a percent of gross growth ranges from a low of 17 percent for softwood sawtimber to a high of 27 percent for hardwood growing stock. Thus, on the average about one-fourth of the gross growth each year is lost to mortality.

Much of this mortality is associated with the adverse effects of high stand density and improper tree spacing within stands; improper spacing also causes a general lowering of diameter growth rates. A substantial portion of this mortality and lower growth

rate is the result of numerous tree diseases and destructive insect populations present in Vermont forests. Some of these insect populations and tree diseases have reached epidemic proportions as, for example, the beech scale-nectria complex, the spruce budworm, and birch dieback.

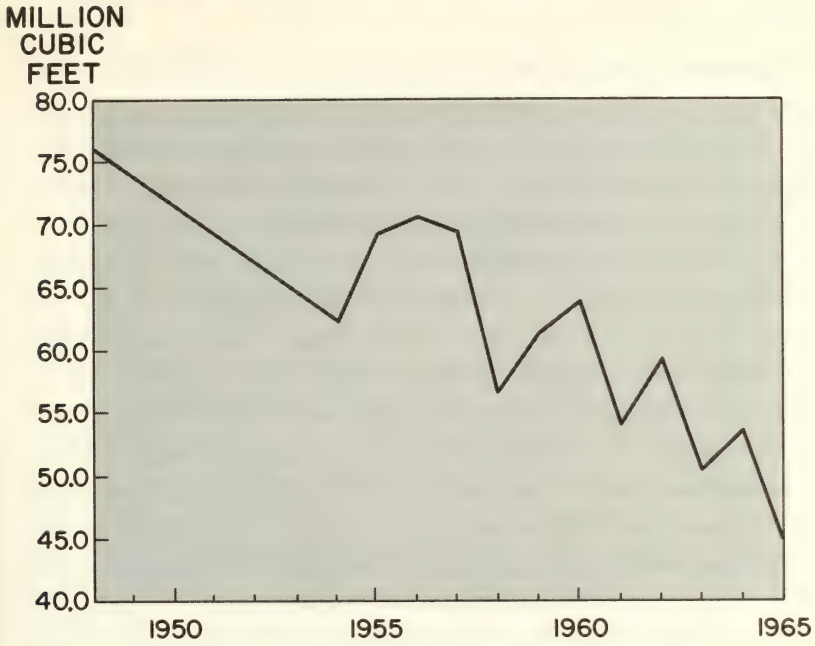
Between surveys the average net annual growth of growing stock exceeded the average annual timber cut for both softwood and hardwood growing stock. However, the average annual cut of sawtimber exceeded the average annual net growth of sawtimber for both softwoods and hardwoods. But because timber cutting in Vermont has recently declined substantially, net annual growth of sawtimber now exceeds the cut for both softwoods and hardwoods. This low level of timber cut probably will continue.

The comparison of growth and cut shows that, while the growth-to-cut relationship is now more favorable than the average growth-cut relationship between forest surveys, it could be made even more favorable if the loss of growth due to mortality were reduced. The implications of this fact are discussed more fully in the sections of this report that deal with future timber supply and with opportunties for forest management.

Timber Products Output

The average annual timber cut shown in tables 21 and 22 of this report was developed from the remeasurement of permanent sample plots and should not be confused with the timber-products output estimates in table 28 and the timber cut in tables 29 through 32, which are based on the 1965 state report of timber-products output. Timber cut based on an average over the period between forest surveys gives a more reliable description of the growth and cut trend and more accurately assesses the changes in the timber inventory since 1948. The timber cut estimates for a particular year are more useful when cut is related to the output of timber products. In this section the data obtained from the state timber-products-output report are utilized and supplemented with information on timber utilization that was developed in conjunction with the forest survey.

The production of timber products from Vermont's forests has generally declined since 1948.



The total production of timber products in Vermont has declined at the rate of 1.6 million cubic feet per year since 1948. In 1948 Vermont produced 75.1 million cubic feet of timber products. By 1965 total timber production had dropped to 45.8 million cubic feet. This decline has not been a constant decline, but rather it has been characterized by several ups and downs.

Sawlog Production

The number of active sawmills in Vermont has declined steadily since the late 1940's. In 1965, 191 sawmills were active in the State. These mills consumed 115.2 million board feet of sawlogs. This volume is nearly 43 percent of the total volume of all timber products produced.

Of the 115.2 million board feet consumed, 65.5 million was hardwood and 49.7 million was softwood. Windsor County produced the largest cut of sawlogs in 1965—15 percent of the

State's total production. Five counties—Windsor, Windham, Addison, Bennington, and Orange—produced 64 percent of Vermont's sawlog production.

Pulpwood Production

Vermont has one operating woodpulp mill, which has a capacity of 44 tons of groundwood pulp per day. Not all of Vermont's pulpwood harvest is consumed in Vermont. Substantial volumes are shipped to New York, New Hampshire, and Canada.

In 1965 Vermont produced 113,000 cords of round pulpwood. This volume represents a decline of 69,547 cords from the 1955 total of 182,547 cords. Most of the State's round pulpwood is softwood—87,000 cords; 80,700 cords of this is spruce and fir. Essex County produced 35,900 cords to lead all other counties. Caledonia produced 16,600 cords in 1965 to place second among the counties. Part of the decline in round pulpwood production in Vermont has been offset by an increase in the production of chips for woodpulp manufacture. In 1965 Vermont chipping plants produced the equivalent of 36,000 cords of pulpwood from sawmill slabs and edgings. Most of this volume, 29,900 cords, was hardwood.

The pulpwood chip industry has shown recent outstanding growth. In 1963 Vermont produced 17,700 cords of pulpwood chips. Not all the chips produced in Vermont are produced from slabs and edgings from Vermont sawmills. About 8,900 cords were produced from sawmill slabs and edgings shipped into Vermont from other states. In addition to the volume of pulpwood in round form and in chips, Vermont produced 1,100 cords of veneer cores and other wood-industry residues that were utilized by pulpmills. In total, Vermont produced 150,100 cords of all forms of pulpwood in 1965.

Veneer Production

The veneer industry in Vermont primarily produces high-quality veneer from northern hardwood species like yellow birch. In 1965 Vermont had seven veneer plants. This industry has been relatively steady with occasional dips and recoveries. In 1954 the State produced 14 million board feet of veneer logs. By 1961

production had dropped to 10 million, but in 1965 it was over 15 million feet.

Other Products

Besides sawlogs, pulpwood, and veneer logs, Vermont also produces a variety of other timber products. These other products include turnery bolts, bobbins for the textile industry, wooden bowls, clapboards for siding, novelty fence products, posts, poles, piling, and fuelwood. These products account for nearly 26 percent—11.7 million cubic feet—of Vermont's total timber-products output.

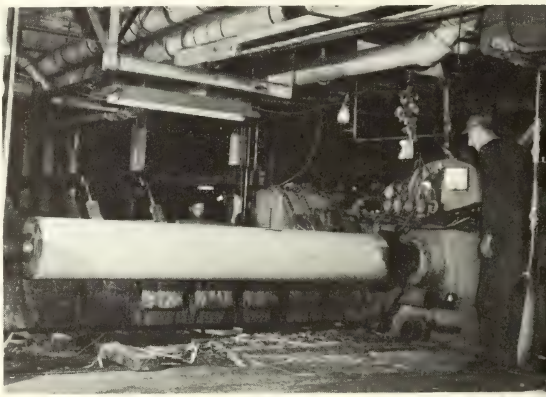
The largest of these other products is fuelwood, which accounted for 73,420 cords in 1965. However, fuelwood constitutes a relatively minor drain on the growing-stock base because only about 41 percent of the fuelwood production comes from growing stock. The remaining 59 percent is produced from sawmill residues, dead trees, rough and/or rotten trees, and trees not on forest land like trees in fence rows and shade trees.

With the exception of fuelwood, the largest single product in the other-products category is boltwood. In 1965 this product amounted to 15.8 million board feet. Generally these bolts are manufactured into turned or routed handles for various items from paint brushes and screw drivers to ax handles and squares for the furniture industry. In 1965 Vermont had 25 establishments that consumed such bolts.

The bobbin industry, which utilizes primarily hard (sugar) maple and birch, is a long-standing industry in northern New England. This industry supplies bobbins and spindles to the textile industry. After World War II the textile industry began to move out of southern New England; and this exodus, to some degree, caused a decline in the bobbin industry's rate of growth. Production between 1954 and 1965 fell from a high of 16.5 million board feet in 1956 to a low of 6.7 million in 1963. By 1965 production had risen to 8.7 million feet. The future of this industry is somewhat questionable, particularly if other materials can be substituted for bobbins. However, as of 1965 there were still six bobbin mills in the State.

SOME SCENES OF VERMONT'S VARIED FOREST PRODUCTS INDUSTRY

Hauling out red spruce sawlogs with a team and sled.



Rotary cut yellow birch veneer — one of Vermont's higher valued forest products.

The 1967 National Christmas tree came from Vermont.

Some of Vermont's many maple sugar products.

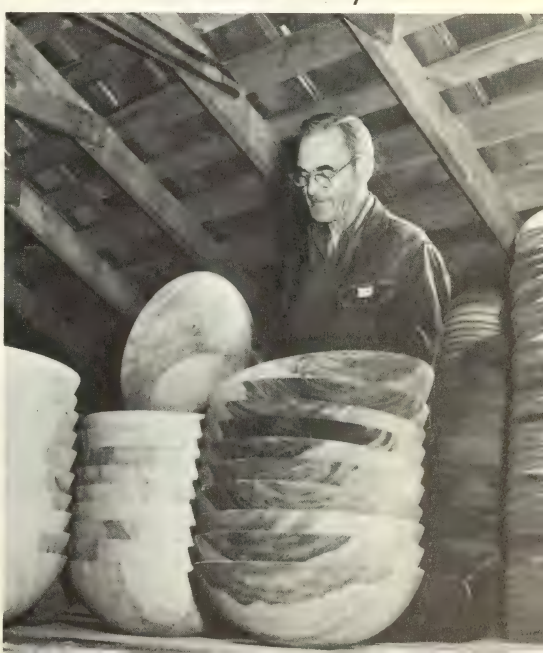
Rustic log cabin being built from a pre-cut kit.

A rick of spruce pulpwood.

Stacking lumber to air dry.

Shipping pallets manufactured from local lumber.

Inspecting turned hardwood bowls for dryness.



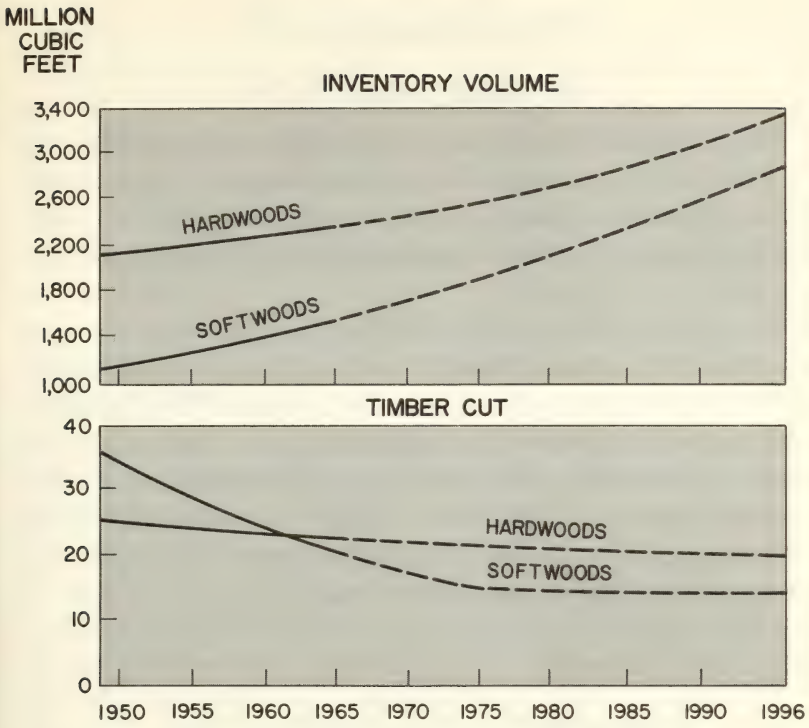
The hardwood bowl industry is another small but important industry in Vermont. This industry primarily utilizes hard maple also. The bowls are a popular tourist item. This industry consumed a little over ½ million board feet in 1965.

Timber Supply Outlook

All long-range projections of timber supply are subject to many uncertainties. The results of such projections can only be considered in the light of the basic assumptions that must precede the projections.

The following assessment of the future supply of timber in Vermont is based on several principal assumptions. The first assumption is that the annual timber cut will decrease at the rate of 2 percent per year until 1976 and then timber cut will remain constant for the remainder of the projection period, 1976 to 1996. This decline in timber cut will not be evenly distributed between hardwoods and softwoods. It is anticipated that the decline in softwood cut will be 2.5 percent per year. The reason for these assumptions is that over the 18 years between forest surveys annual timber cut has declined at slightly more than 2 percent (2.2 percent) per year. The recent trend in softwood cut shows an average annual decline of about 2.5 percent per year. We do not foresee any ecnomic or industrial developments that will reverse this trend in Vermont's timber cut.

The remaining assumptions are that forest land area will not increase or decrease significantly and that, as a percent of growing-stock volume, net annual growth of growing stock and annual mortality of growing stock will remain at the 1965 levels. Vermont is now 73 percent forested. Most of the State's present unforested open land is located in the fertile Champlain Valley or in the Connecticut River Valley and is prime agricultural and pasture land. It appears highly improbable that any significant amount of this land will be allowed to revert to forest land. Because data are not available that will show relative changes in



All growing stock projected growth and cut.

growth and mortality as the density of timber stands increases, these factors have to be held at the 1965 level. This fact forces the ending volume estimate, in 1996, to be slightly higher than might be expected realistically.

The projection clearly shows that Vermont will have an ample supply of timber for the next 30 years. However, it appears almost certain that, though timber quantity will not be wanting, timber quality will be unless vigorous efforts are made to improve it. The average stocking of timber stands in Vermont is unusually high, and the projection indicates that stocking will become even higher. Overcrowded stands are less vigorous than more favorably stocked stands, so the incidence of disease and insect damage is greater. Therefore one can expect that even more quality growing stock will be lost to cull and mortality than is now the case in Vermont.

Management Opportunities

The forest survey has clearly shown that the forest resources of Vermont are not as productive as they could be. For example, the net growth of growing stock averages only about 19 cubic feet per acre per year. Yet net growth could average 40 cubic feet per acre per year or more.

The quality of the growing stock in the State's timber stands also leaves much to be desired. Very few stands in Vermont are well stocked with desirable trees. Only 2.9 million acres of forest land are well stocked with growing-stock trees. This means that nearly a third of Vermont's forest land is predominantly stocked with trees that are too poor to be considered growing stock. Table 13 of the appendix shows that 26 percent of all trees in Vermont's stands are classified rough and/or rotten.

A forester marks a large red maple for cutting.

Previous sections of this report and many of the tables in the appendix clearly attest to the present conditions of much of Vermont's forest land. To present these data again in this section would be redundant. Suffice it to say that in Vermont ample opportunities for more extensive timber management exist. The purpose of this section is to point out some of these opportunities and to suggest ways to improve the productivity of the State's forest land.

Timber-Stand Improvement

An excellent opportunity exists to increase the area of commercial forest land that is well stocked with desirable growing-stock trees and to raise the average net annual growth of growing stock by timber-stand-improvement treatments. A high growth rate of quality material could be realized if mature, surplus, and rough and rotten trees were removed, and if various other silvicultural treatments that would improve tree spacing, timber quality, and stand vigor were applied.

Low-quality trees can be removed by direct timber-stand-improvement programs, by timber sales, and by encouraging the establishment of industries that will utilize low-quality material in bulk.

The role of the forester in helping to accomplish these tasks is important. Foresters can assist timber owners in marking and selling timber. Wherever possible, cutting contracts should specify the removal of cull trees, and cuts should be designed to improve the stand—particularly to improve stocking with desirable trees properly spaced in the stand. In marking stands for cutting the forester generally will recognize four important types or classes of trees that should be removed:

- Trees that may die before the next cut.
- Trees of low quality and vigor.
- Less desirable species.
- Multiple-stem trees.

Vermont has large areas in two major stand groups: (1) old growth, essentially unmanaged stands that frequently contain a high proportion of mature, overmature, and rough and/or rotten trees; and (2) young even-aged stands that resulted from heavy cutting 60 to 80 years ago and that are now reaching merchantable size.

In old-growth stands that contain a good proportion of desirable trees and where uneven-aged management for tolerant species is the objective, group or individual tree selection cuttings may be applied. The initial cut should remove most of the older and defective trees. In old-growth stands that contain very few promising younger trees or where the management objective is for the less tolerant species, the initial cut should be a harvest in

A thinned red pine plantation. Thinning improves tree spacing, which results in faster growing, higher quality trees.

Undesirable or rough and/or rotten trees often must be girdled or removed. Here a forester girdles a beech *(Fagus grandifolia)* that has become infected by beech scale-nectria complex *(Cryptococcus fagi-Nectria coccinea* var. *faginata).*

the form of clearcutting or strip, patch, or shelterwood cutting. All unmerchantable trees also must be removed from clearcut areas—including the small openings made by strip, patch, or group selection cutting. Adequate seedbeds also either must be present in these openings naturally or must be prepared mechanically, particularly if regeneration of paper birch and yellow birch is the objective.[9]

[9] For a further discussion of the management of northern hardwoods see: Gilbert, Adrian M. and Victor S. Jensen. A MANAGEMENT GUIDE FOR NORTHERN HARDWOODS IN NEW ENGLAND. NE. Forest Exp. Sta. Sta. Paper 112. 22 pp., illus. Upper Darby, Pa. 1958.

In the younger even-aged stands, initial cuts should be improvement cuts to favor the desired species, eliminate defective and less desirable stems, and stimulate the growth rate. Periodic cutting and timber-stand-improvement treatments may then be scheduled to maintain growth and quality of the stand to maturity. Occasionally an apparently good site will be occupied by a young stand that does not contain enough valuable or potentially valuable stems to form an acceptable stand. In such cases the stand must be clearcut and a new stand of acceptable trees regenerated.

The encouragement of industries that will utilize low-quality material is invariably desirable. Few, if any, states have enough of these industries. Therefore, it would be unrealistic to expect to encourage enough of these industries to do more than a small fraction of the timber-stand-improvement job. Yet, they should be encouraged so that they may contribute as fully as possible.

Insects and Diseases

Control of the many destructive insects and diseases that plague Vermont's forests presents another opportunity to increase the quantity and to improve the quality of the future timber supply. Each year 24 percent of the gross growth of growing stock is lost to mortality (table 24). By comparison, the average annual timber cut of growing stock (table 30) equals only 39 percent of gross growth. Clearly, a substantial reduction in mortality could materially increase the amount of timber available for harvest.

However, mortality is only a part of the loss caused by disease and insect pests. Thousands of dollars are lost annually because insects and diseases reduce growth rates, weaken trees, and make low-value or worthless rough and rotten trees of what were once growing-stock trees.

Specific efforts are necessary to combat the effects of insects and diseases. The healthy, vigorous stands that can be developed through timber-stand-improvement programs can help prevent some insect and disease losses. However, the major opportunity for reducing insect and disease losses lies in direct, specific programs aimed at specific pests. Many control programs already are

operating in the State. These programs could well be expanded to provide control for a larger share of Vermont's timber lands.

Many forest insect and disease pests are not well understood. These provide an opportunity for much needed research and for development of effective controls. Ample opportunity also exists to develop more effective and less costly control methods that can be applied to those pests for which control methods already exist.

Forest Land Ownership

As pointed out earlier, 43 percent of Vermont's commercial forest land is in the miscellaneous private ownership category and 31 percent is owned by farmers. This means that 74 percent of the State's commercial forest land is in ownership categories characterized by relatively small individual holdings. Many of these small ownerships are too small for effective timber management. Then too, these properties change hands more frequently than do larger tracts. These facts profoundly affect timber-management planning.

Stability of ownership or the continuation of a positive attitude on the part of the owners is an important prerequisite to successful forest management. One treatment of a stand in a management cycle may not achieve its proportional part of stand improvement. This means that if four treatments are needed, one treatment may yield considerably less than one-quarter of the benefit that could be obtained from the full four treatments. In view of this, how might management programs be altered for different sizes of ownership and different owner groups to achieve the maximum success? Forestry assistance groups might best give their maximum effort to those larger holdings—public lands, industrial lands, and larger private ownerships—where stability of ownership and owner attitude indicate that the holding is very likely to be available for continued management over an extended period of time.

The owners of small forest tracts should not be ignored. These owners could be assisted in marking and marketing. Demonstration stands could be set up and educational programs and literature made available. Great interest in forest management could

The American Tree Farm Program has been a valuable stimulus to timber management on private lands.

be generated when other owners see successfully managed, profitable forests around them. Ways should be investigated to encourage these owners to form voluntary associations and organizations to achieve economic timber-management and timber-marketing units.

Summary

The development of healthy, vigorous stands of high-quality trees can be a valuable asset to Vermont's economy. The decline of timber quality in Vermont has in large part been responsible for the decline in the production of timber products over the past 18 years. Unless timber-management activities are expanded to

develop higher quality, faster growing timber, this decline very likely will continue.

The opportunities for timber management in Vermont can nearly be summed up on one word—expand. If Vermont's forests are to realize their full potential for timber production, timber-management efforts must be expanded. Past forestry efforts in the State, while technically sound, have not developed the vigorous high-quality productive stands that Vermont needs because the area under continued forest management is too small to influence the conditions significantly.

■

Appendix

DEFINITION OF TERMS

Forest Area

Forest land. — Land at least 10 percent stocked with forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. The minimum area for classification of forest land, or subclassses of forest land (commercial forest land, noncommercial forest land, productive-reserved forest land, and unproductive forest land), is 1 acre. Roadside and streamside strips of timber must have a crown width of 120 feet or more to qualify as forest land. Unimproved roads and trails, streams, and clearings less than 120 feet wide are classified as forest.

Commercial forest land. — Forest land that is producing or is capable of producing timber crops and that is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for timber management and capable of producing in excess of 20 cubic feet per acre of annual growth. This includes both accessible and inaccessible and both operable and inoperable trees.

Noncommercial forest land. — Forest land that is incapable of yielding timber crops because of adverse site conditions (unproductive forest land), and productive forest land that is withdrawn from commercial timber use through statute or administrative regulation (productive-reserved forest land).

Productive-reserved forest land. — See noncommercial forest land.

Unproductive forest land. — See noncommercial forest land.

Nonforest land. — Land that has never supported forests; and lands formerly forested but now in nonforest uses like crops, pasture, urban areas, and the like.

Ownership Classes

National forest lands. — Commercial forest land under the administration of the National Forest Administration Branch of the U. S. Forest Service.

State forest land. — Commercial forest land owned or leased by the State for more than 50 years, and designated State Forest.

Other public forest land. — Commercial forest land owned or administered by any Federal agency or by any state, county, or municipal government other than the National and State forests.

Farmer-owned lands. — Commercial forest land owned by operators of farms. Land not connected to the farmstead is included if owned by a farm operator.

Other private forest land. — Privately owned commercial forest land other than farmer-owned or forest industry lands.

Forest industry lands. — Lands owned by companies or individuals operating wood-using plants.

Stand-Size Classes

Stand. — A growth of trees on a minimum of 1 acre of forest land that is at least 10 percent stocked by forest trees of any size.

Sawtimber stands. — Stands at least 10 percent stocked with growing-stock trees; with half or more of this stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands. — Stands at least 10 percent stocked with growing-stock trees, with half or more of this stocking in poletimber and/or sawtimber trees and with poletimber stocking exceeding that of sawtimber.

Sapling-and-seedling stands. — Stands at least 10 percent stocked with growing-stock trees and with saplings and/or seedlings comprising more than half of this stocking. Sapling-and-seedling stands may have poletimber and/or sawtimber volume. This will be particularly true for cutover areas where seed trees or part of the original stand has been left as a seed source and where pastures or farm lands with a few large old trees have begun to revert to forest land.

Nonstocked areas. — Commercial forest land less than 10 percent stocked with growing-stock trees.

Forest Types

White-red pine. — Forests in which eastern white pine or red pine, singly or in combination, comprise a plurality of the stocking. (Common associates include hemlock, aspen, birch, and maple.)

Spruce-fir. — Forests in which spruce or true firs, singly or in combination, comprise a plurality of the stocking. (Common associates include white cedar, tamarack, maple, birch, and hemlock.)

Oak-pine. — In Vermont, forests in which hardwoods (usually northern red oak and white ash) comprise a plurality of the stocking but in which white pine comprises 25 to 50 percent of the stocking. (Common associates include pitch pine, eastern redcedar, red pine, hickory, and other oaks.)

Oak-hickory. — Forests in which upland oak or hickory, singly or in combination, comprise a plurality of the stocking except where pines comprise 25 to 50 percent in which case the stand is classified oak-pine. (Common associates include elm and maple.)

Elm-ash-red maple. — Forests in which elm, ash, or red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include beech, sugar maple and birch.)

Maple-beech-birch. — Forests, in which maple, beech, or yellow birch singly or in combination, comprise a plurality of the stocking. (Common associates include hemlock, elm, basswood, and white pine.)

Aspen-birch. — Forests in which aspen, paper birch, or gray birch, singly or in combination, comprise a plurality of the stocking. (Common associates include red maple, balsam fir, white spruce, and black spruce.)

Class of Timber

Commercial species. — Tree species now or prospectively suitable for industrial wood products. Noncommercial species are those not now nor prospectively suitable for industrial wood products. Gray birch and striped maple are examples of noncommercial species.

Growing-stock trees. — All live trees except rough and/or rotten trees.

Sawtimber trees. — Live trees of commercial species containing at least one 12-foot sawlog. Softwoods must be at least 9.0 inches in diameter at breast height and hardwoods must be at least 11.0 inches in diameter at breast height.

Poletimber trees. — Live trees of commercial species at least 5.0 inches in diameter at breast height, but smaller than sawtimber size, and of good form and vigor.

Saplings. — Live trees of commercial species 1.0 to 5.0 inches in diameter at breast height and of good form and vigor.

Seedlings. — Live trees of commercial species less than 1.0 inch in diameter at breast height that are expected to survive.

Desirable trees. — Growing-stock trees that have no serious defects in quality that limit present or prospective use, have relatively high vigor, and contain no pathogens that may result in death or serious deterioration before rotation age. They include the type of trees forest managers aim to grow; that is, the trees that would be favored in silivicultural operations.

Rough and/or rotten trees. — Live trees of sawtimber or poletimber size that do not contain at least one 12-foot sawlog now or prospectively because sweep, crook, poor form, or rot is excessive or because they are of noncommercial species.

Measurements and Units of Measure

Area-condition classes. — A classification of commercial forest land based upon stocking by desirable trees and other conditions affecting current and prospective timber growth. For a listing and description of area-condition classes see the footnote to appendix table 7.

Stocking. — The degree of occupancy of land by trees, measured in terms of basal area and/or the number of trees in a stand compared to the basal area and/or number of trees required to utilize fully the growth potential of the land. The actual stocking at a point was evaluated against a standard of 60 square feet of basal area per acre for trees 5.0 inches d.b.h. and larger, or its equivalent in numbers of trees per acre for seedlings and saplings. The stocking percentage for a sample plot is derived from the stocking for each of the 10 points. Three categories of stocking are used:

- All live trees. — These are used in the classification of forest land and forest types.
- Growing-stock trees. — These are used in the classification of stand-size classes.
- Desirable trees. — These are used in the classification of area-condition classes.

Basal area. — A unit of measure used to express stand density, growth, and cut. The basal area of a tree is the area of the cross section at breast height expressed, usually, in square feet. Thus, the basal area of a stand would be the sum of the areas of cross section of all trees, growing-stock

trees, or desirable trees — depending upon the use to which the estimate is to be put.

Diameter at breast height (d.b.h.). — Tree diameter in inches, outside bark, measured at 4½ feet above ground.

Diameter classes. — The 2-inch diameter classes extend from 1.0 inch below to 0.9 inch above the stated midpoint. For example, the 6-inch class contains trees 5.0 to 6.9 inches d.b.h.

Board foot. — One board foot equals the volume of a board 1 foot long by 1 foot wide and 1 inch thick. This is the standard unit of measure for lumber in the United States and Canada.

Standard cord. — A unit of measure for stacked wood encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying a factor of 80 cubic feet of wood (inside bark) per rough cord.

Timber Volume

Volume of sawtimber. — Net volume in board feet of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber. All sawtimber and lumber volumes in this report are based on the International ¼-inch rule for estimating log volumes in board feet.

Volume of growing stock. — Volume of sound wood in the bole of sawtimber and poletimber trees from a 1-foot stump to a minimum 4.0 inch top outside bark or to the point where the central stem breaks into limbs.

Growth and Cut of Timber

Gross growth of all trees. — Growth of all trees without reduction for cull and including growth of rough and rotten trees plus annual mortality.

Net annual gross growth. — Net annual growth (grass growth minus cull) plus annual mortality.

Net annual growth of growing stock. — The annual change in volume of sound wood in live sawtimber and poletimber trees. (Growth minus mortality).

Net annual growth of sawtimber. — The annual change in net board-foot volume of live sawtimber trees.

Mortality of growing stock. — The volume of sound wood in live sawtimber and poletimber trees dying annually from natural causes.

Mortality of sawtimber. — The net board-foot volume of sawtimber trees dying annually from natural causes.

Timber cut from growing stock. — The volume of sound wood in growing-stock trees cut for forest products during a specified period, including both roundwood products and logging residues.

Timber cut from sawtimber. — The net board-foot volume of live sawtimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

Timber products. — Roundwood products and byproducts of wood manufacturing plants.

Logging residues. — The unusued growing-stock portion of growing-stock trees cut for products and left in the woods, and also growing-

stock trees destroyed or removed in the course of logging and not utilized for products.

Minimum full utilization. — The minimum stand density required to utilize fully the potential of the site. For Vermont this has been defined as 60 square feet of basal area per acre.

Log Grades

Log grades are a classification of logs based on external characteristics as indicators of quality or value. Log grade standards and grading systems for eastern tree species are outlined below.

SPRUCE, FIR, HEMLOCK, TAMARACK AND CEDAR LOGS

Minimum merchantability specifications

Diameter inside bark [1]	*Length* [2]	*Total deduction*	*Sweep permitted*	*Other requirements*
Inches	*Feet*	*Percent*	*Percent*	Sound knots not over 2 inches in diameter permitted. Shake permitted up to 20 percent of gross scale if not combined with other serious defects.
6-12	8-16 in 2-foot multiples	50	25	
13 +	8-16 in 2-foot multiples	50	25	Sound knots not over 3 inches in diameter permitted. Shake permitted up to 20 percent of gross scale if not combined with other serious defects.

[1] At small end of log.

[2] Without trim.

WHITE PINE LOG GRADES

Trial specifications (revised)

Log grade	*Minimum size*		*Defect allowance*		*Maximum weevil injury*	*Allowable knot size (inches on 3 best faces or minimum clearness on 4 faces)*
	Diameter	*Length*[1]	*Sweep or crook*	*Total cull including sweep*		
No. 1 (Select)	*Inches* 12 & 13	*Feet* 8-16	*Percent* 20	*Percent* 50	*Number* 0	4 faces free of knots ½ inch or larger full length of log.
	14 +	10-16	20	50	0	2 faces free of knots ½ inch or larger full length of log, or 4 faces free of knots ½ inch or larger 50 percent length of log (6 feet minimum length), or [2].
No. 2 (Finish)	6 +	8-16	30	50	0	Sound red knots $\leqq$ [3] D/6 and no larger than 3 inches. Black knots: Butt logs $\leqq$ (D/12) and no larger than 1½ inches. Upper logs $\leqq$ D/10)) and no larger than 1½ inches or 4 faces free of knots ½ inch or larger 50 percent length of log.
No. 3 (Premium)	6 +	8-16	40	50	8 foot logs: 1 weevil 10 foot + logs: 2 weevils	Sound red knots $\leqq$ D/3 and no larger than 5 inches. Black knots $\leqq$ D/6 and no larger than 2½ inches.
No. 4 (Standard)	6 +	8-16	50	50	No limit	No limit.

[1] Plus trim.

[2] If the sum of the diameters of sound red knots plus 2 times (sum of the diameters of dead or black knots) in inches is $\leqq$ ½ the diameter of the log (in inches).

[3] $\leqq$ means equal to or less than.

HARDWOOD LUMBER LOGS

Grade factors *		*Specifications*							
		Log grade 1			*Log grade 2*				*Log grade 3*
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Minimum diameter (inches)		13-15[1]	16-19	20+	11[2]	12+			8+
Minimum length (feet)		10+	10+	10+	10+	8-9	10-11	12+	8+
Clear cuttings** on each of the 3 best faces	Minimum length (feet)	7	5	3	3	3	3	3	2
	Maximum number	2	2	2	2	2	2	3	—
	Minimum yield in face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance (percent of gross volume)		15			30				50
Maximum cull and sweep allowance (percent of gross volume)		40[3]			50[4]				50

* End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in Forest Prod. Lab. Rpt. D1737.

** A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.

[1] Ash and basswood butts can be 12 inches if otherwise meeting requirements for small No. 1's.

[2] Ten-inch logs of all species can be No. 2 if otherwise meeting requirements for small No. 1's.

[3] Otherwise No. 1 logs with 51 to 60 percent cull can be No. 2.

[4] Otherwise No. 2 logs with 51 to 60 percent cull can be No. 3.

TIE-AND-TIMBER LOGS

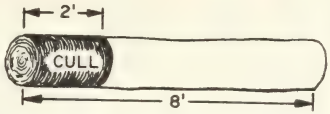
Grade factors		*Specifications*
Position in tree		Butts and uppers
Scaling diameter (inches)		8 +
Length, without trim (feet)		8 +
Clear cuttings		No requirements: not graded on cutting basis.
Maximum sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound surface defects** permitted	Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.	

* Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

** Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

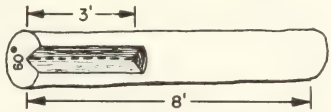
METHODS OF DETERMINING SCALING DEDUCTION

(Examples based on an 8-foot log with 20-inch scaling diameter)



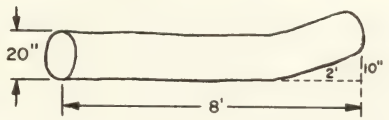
If section of bole is affected, deduct percent of log length affected.

Example: $\frac{2}{8} = 25$ percent cull



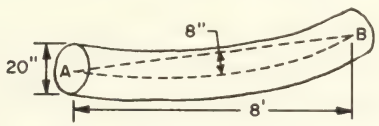
If sector is affected, multiply percent of circle times percent of length.

Example: $\frac{60°}{360°} \times \frac{3}{8} = 6$ percent cull



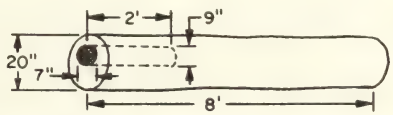
For a crook, multiply proportion of diameter displaced times proportion of log length affected by crook.*

Example: $\frac{10}{20} \times \frac{2}{8} = 12$ percent board-foot cull



For a sweep, determine sweep departure and subtract 1 inch for 8-foot logs or 2 inches for 16-foot logs. Divide by log diameter.

Example: $\frac{8 - 1}{20} = 35$ percent board-foot cull**



For interior cull, square out interior cull as a percent of total volume of the section. For board-foot cull, add 1 inch to width and to thickness; for cubic-foot cull, use actual dimensions of rot. For board-foot cull divide width and thickness by the scaling diameter (average d.i.b., small end) minus 1; for cubic-foot cull, divide by scaling diameter. Multiply fractions by percent of log affected.

Example: $\frac{8 \times 10}{20\text{-}1} \times \frac{2}{8} = 6$ percent cubic-foot cull.

* No reduction of cubic-foot volume will be made.

** If a straight line between A and B falls outside the bark, the affected section is over 50 percent cull in board feet.

FOREST-SURVEY METHODS

Forest area and timber volume estimates are based upon information obtained from two sets of aerial photographs (10 or more years between the two) and sample photo plots and ground plots. Photo plots were pin-pointed on each set of aerial photographs so they were distributed uniformly over the entire State. Each photo plot was classified as either forest or nonforest, and each forest plot was classified into sampling strata. These strata were stand-size classes on the initial survey and were cubic-foot-volume-per-acre classes on the resurvey.

Field crews on the first survey inspected on the ground many sample plots selected from the photo plots. Area, volume, and growth were recorded. These data were the basis for the initial estimate of the timber resources of Vermont.

A sample of 260 of the initial ground plots were visited on the resurvey. These consisted of 88 plots on the Green Mountain National Forest, which was one of the five geographic sampling units. The remaining 190 plots were on all other land and were distributed throughout the state in two sampling units. Plot centers were relocated and trees were retallied. The two tallies were reconciled with each other on the plot.

Data from the remeasured plots were used to obtain the first part of a combined estimate of current forest area and timber volume, and estimates of net annual growth, mortality, and timber cut. Regression equations calculated from the remeasured plots brought up to date the volume estimates of the first survey.

A second estimate of volume and area was calculated from 820 new ground plots. These plots were a sample of the photo interpretation of 10,253 photo points in the most recent aerial photography.

Volume estimates for both the remeasured and the new ground plots were calculated using one of 17 species-group equations. To make the cubic-foot volume calculations, remeasured plot data on height and merchantability by d.b.h. class were used. Similar ratios were developed to convert gross cubic-foot volume to net board-to-foot volume.

The two estimates of volume and area were weighted by their variance reciprocal and combined. This resulted in a new estimate of total acreage and of total volume. The associated sampling error for each total was also obtained. These totals were then partitioned into the various categories of area and volume (e.g. volume by species and d.b.h. class) using the data obtained from the new ground plot sample.

Estimates of average net annual growth, mortality, and timber cut were based entirely upon the 260 remeasured plots. The volume of growing stock on the plots at time of remeasurement (consisting of both live growing-stock trees and trees that were cut) minus the volume of growing-stock trees on the plots at the time of the forest survey equals net volume growth for the years between measurement.

Stump measurements were used to estimate volumes of cut trees. Measurement of dead trees that were initially classified as live growing-stock trees provided the estimates of mortality.

These estimates for the period between surveys were converted to average net annual growth, mortality, and timber cut by dividing by the number of years between measurements for each plot.

In recent years users of forest-survey data have shown a need for

Foresters estimate volume of a tree on a forest survey plot.

county information. To provide such information, within the framework of the survey design, county tables have been developed based on a survey unit partitioning technique. First the survey unit means and variances for the various photo plot strata are applied to the photo plot data for each county within the survey unit. This yields an estimate of total volume or total commercial forest land area for each county. The associated sampling errors are also calculated for each county total. Next, the data from the new ground plots are used to partition the county totals into their various components. For example, if a table of cubic-foot volume by species is to be made for a county, the estimate of total cubic-foot volume for that county is partitioned into species totals according to the species proportion for all the forest survey new ground plots within the unit.

Comparisons Between Inventories

To evaluate the condition of the forest resource, it is helpful to compare the current inventory with data from the previous inventory. This enables one to assess the trend during the period between inventories. However, for the comparison to be valid, the procedures of the two inventories must be consistent. For example, the use of different volume tables in successive

inventories could lead to totally irrelevant conclusions about the trend between the inventories.

A comparison of the two forest-survey estimates of volume, growth, cut, and mortality in Vermont was made. A computer program TRAS (Timber Resource Analysis System) was utilized.

Analysis of the procedures used in the first inventory revealed numerous differences in the volume estimation procedure when compared to the method used in the second inventory. This does not imply that the initial inventory of Vermont was invalid. The initial inventory was the most reliable estimate possible utilizing the procedures available in 1948. The second inventory is based on newer procedures. *For comparison purposes only,* several adjustments in the initial inventory are necessary.

The initial and the second inventory estimates of the softwood component of volume are comparable. However, the hardwood component is not comparable. Differences in the tree volume estimation procedure are the most probable cause of this. Consequently, by applying the second inventory board-foot and cubic-foot volumes for hardwood species to the initial numbers of trees, a comparable initial inventory was obtained. This comparison initial estimate of hardwood volume is used whenever inventory comparisons are made in this report.

All of the comparisons between inventories are made on the basis of state totals. Survey sampling units were not the same at each occasion, so comparisons at this level are not possible. The present units will be used for the third inventory so comparisons between units will be possible at that time. The procedure for obtaining county data (See: "Forest survey methods") does not make possible comparisons of inventory trend for a county.

Reliability of the Estimates

The forest-area and timber-volume data in this report are based on a carefully designed sample of forest conditions throughout Vermont. However, since neither every acre nor every tree in the State was measured, the figures in this report are the best estimates. A measure of the reliability of these estimates is given by a sampling error. Each estimate in this report had a computed sampling error. Included with the statistical tables are the corresponding sampling errors for row totals and column totals.

Briefly, here is how the sampling error indicates reliability. Our report of the total growing-stock volume in Vermont, 3,765 million cubic feet, has an associated sampling error of 1.9 percent (71.5 million cubic feet). This means that our best estimate of the total growing-stock volume in 1966 is 3,765 million cubic feet. And if there are no errors in procedure, the odds are 2 to 1 that if we repeated the resurvey in the same way, the new estimate of growing-stock volume would be between 3,693 million and 3,836 million cubic feet ($3{,}765 \pm 71.5$). Similarly, the odds are 19 to 1 that it would be within $\pm$ 143 million cubic feet of the present estimate, and 300 to 1 that it would be within $\pm$ 214 million cubic feet.

The computed sampling error is not a complete measure of reliability; there are other sources of error that this term does not include. There could be imperfections in our volume tables and equations and errors in field measurement. Procedural errors were kept to a minimum by careful

training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in the statistical tables are:

	Sampling error (percent)
Commercial forest area 4.3 million acres	1.2
Growing stock volume 3.8 billion cubic feet	1.9
Sawtimber volume 6.6 billion board feet	1.9
Average net annual growth 84.8 million cubic feet	25.2
Average annual timber cut 59.4 million cubic feet	15.3

COMMON COMMERCIAL SPECIES OF VERMONT[10]

Softwoods

Northern white cedar	*Thuja occidentalis*
Eastern redcedar	*Juniperus virginiana*
Balsam fir	*Abies balsamea*
Eastern hemlock	*Tsuga canadensis*
Jack pine	*Pinus banksiana*
Pitch pine	*P. rigida*
Red (Norway) pine	*P. resinosa*
Eastern white pine	*P. strobus*
Black spruce	*Picea mariana*
Norway spruce	*P. abies*
Red spruce	*P. rubens*
White spruce	*P. glauca*
Tamarack (eastern larch, hackmatack)	*Larix laricina*

Hardwoods

Black ash	*Fraxinus nigra*
Green ash	*F. pennsylvanica*
White ash	*F. americana*
Bigtooth aspen	*Populus grandidentata*
Quaking aspen	*P. tremuloides*
American basswood	*Tilia americana*
American beech	*Fagus grandifolia*
Paper birch	*Betula papyrifera*
Sweet (black) birch	*B. lenta*

[10] Little, Elbert L., Jr. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U. S. Dept. Agr., Agr. Handbook 41, 472 pp., 1953.

Yellow birch	*B. alleghaniensis*
Butternut	*Juglans cinerea*
Black cherry	*Prunus serotina*
Elm. spp.	*Ulmus spp.*
Hackberry	*Celtis occidentalis*
Hickory	*Carya spp.*
Red maple	*Acer rubrum*
Silver maple	*A. saccharinum*
Sugar maple	*A. saccharum*
Black oak	*Quercus velutina*
Northern red oak	*Q. rubra*
White oak	*Q. alba*
Balsam poplar (Balm of Gilead)	*Populus balsamifera*

STATISTICAL DATA

Statistical Tables for the State

Table 1.—Area of Vermont, by land classes, 1966.

Table 2.—Area of commercial forest land in Vermont, by ownership classes, 1966.

Table 3.—Area of commercial forest land in Vermont, by stand-size and ownership classes, 1966.

Table 4.—Area of commercial forest land in Vermont, by stand-volume classes for sawtimber and other stand-size classes, 1966.

Table 5.—Area of commercial forest land in Vermont, by stocking classes based on alternative stand components, 1966.

Table 6.—Area of commercial forest land in Vermont, by stocking classes of growing-stock trees and by stand-size classes, 1966.

Table 7.—Area of commercial forest land in Vermont, by area-condition and ownership classes, 1966.

Table 8.—Area of commercial forest land in Vermont, by potential growth-per-acre and ownership classes, 1966.

Table 9.—Area of commercial forest land in Vermont, by forest types and ownership classes, 1966.

Table 10.—Area of noncommercial forest land in Vermont, by forest type, 1966.

Table 11.—Sampling errors, in percent, for major area breakdowns in Vermont, 1966.

Table 12.—Number of growing-stock trees on commercial forest land in Vermont, by diameter classes and by softwoods and hardwoods, 1966.

Table 13.—Number of rough and/or rotten and growing-stock trees on commercial forest land in Vermont, by diameter groups and by softwoods and hardwoods, 1966.

Table 14.—Volume of timber on commercial forest land in Vermont, by class of timber and by softwoods and hardwoods, 1966.

Table 15.—Volume of growing stock and sawtimber on commercial forest land in Vermont, by ownership classes and by softwoods and hardwoods, 1966.

Table 16.—Volume of growing stock and sawtimber on commercial forest land in Vermont, by stand-size classes and by softwoods and hardwoods, 1966.

Table 17.—Volume of growing stock on commercial forest land in Vermont, by species and diameter classes, 1966.

Table 18.—Volume of sawtimber on commercial forest land in Vermont, by species and diameter classes, 1966.

Table 19.—Volume of sawtimber on commercial forest land in Vermont, by species and quality classes, 1966.

Table 20.—Sampling errors, in percent, for major timber volume breakdowns in Vermont, 1966.

Table 21.—Average net annual growth and annual cut of growing stock and sawtimber on commercial forest land in Vermont, by species, 1948-1965.

Table 22.—Average net annual growth and annual cut of growing stock on commercial forest land in Vermont, by ownership classes and by softwoods and hardwoods, 1948-1965.

Table 23.—Average net annual growth and annual cut of sawtimber on commercial forest land in Vermont, by ownership classes and by softwoods and hardwoods, 1948-1965.

Table 24.—Components of average net annual growth of growing stock and sawtimber on commercial forest land in Vermont, by species group, 1948-1965.

Table 25.—Average annual mortality of growing stock and sawtimber on commercial forest land in Vermont, by species, 1948-1965.

Table 26(A).—Average annual mortality of growing stock and sawtimber on commercial forest land in Vermont, by ownership classes and by softwoods and hardwoods, 1948-1965.

Table 26(B).—Average annual mortality of growing stock and sawtimber on commercial forest land in Vermont, by causes and by softwoods and hardwoods, 1948-1965.

Table 27.—Sampling errors, in percent, for major breakdowns of average annual growth, cut, and mortality of growing stock and sawtimber, in Vermont, 1948-1965.

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Table 1. — *Area of Vermont, by land classes, 1966*

Land class	Area	
	Thousand acres	*Percent*
Commercial forest land	4,295	73
Unproductive forest land	20	(1)
Productive-reserved forest land	7	(1)
Total forest land	4,322	73
Nonforest land[2]	1,615	27
All land[3]	5,937	100
Total area	6,150	—

Sampling errors for major breakdowns of area for all tables are given in table 11.

[1] Less than 1 percent.

[2] Includes 19,600 acres of water according to Survey standards of area classification but defined by the Bureau of Census as land.

[3] Land area from 1964 Census of Agriculture. Total area less water areas of 40 acres or larger.

Table 2. — *Area of commercial forest land in Vermont, by ownership classes, 1966*

Ownership class	Area	
	Thousand acres	*Percent*
National forest	220	5
Other Federal	4	(1)
State	131	3
County and municipal	44	1
Total public	399	9
Forest industry:		
Pulp and paper	317	7
Lumber	279	7
Other	82	2
Total forest industry	678	16
Farmer-owned[2]	1,352	32
Miscellaneous private	1,866	43
All ownerships	4,295	100

[1] Less than 1 percent.

[2] Estimate based upon sample plots; not from the Census of Agriculture.

Table 3. — *Area of commercial forest land in Vermont, by stand-size and ownership classes, 1966*

(In thousands of acres)

Stand-size class	All ownerships	Public	Forest industry	Farmer and misc. private
Sawtimber stands	1,768	186	365	1,217
Poletimber stands	1,500	137	218	1,145
Sapling-and-seedling stands	988	75	95	818
Nonstocked areas	39	1	—	38
All classes	4,295	399	678	3,218

Table 4. — *Area of commercial forest land in Vermont, by stand-volume classes for sawtimber and other stand-size classes, 1966*

(In thousands of acres)

Stand volumes per acre[1]	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	2,425	289	2,136
1,500 to 5,000 board feet	1,625	1,234	391
More than 5,000 board feet	245	245	—
All classes	4,295	1,768	2,527

[1] Net volume, International ¼-inch rule.

Table 5. — *Area of commercial forest land in Vermont, by stocking classes based on alterative stand components, 1966*

(In thousands of acres)

Stocking class (percentage of normal stocking*)	Stocking classified in terms of—		
	All trees	Growing-stock trees	Desirable trees
90 and up	3,783	1,920	15
80 to 90	229	504	20
70 to 80	104	447	37
60 to 70	57	459	117
50 to 60	28	349	108
40 to 50	28	280	241
30 to 40	27	136	215
20 to 30	21	115	421
10 to 20	—	46	887
Less than 10	18	39	2,234
All areas	4,295	4,295	4,295

* Normal stocking for Vermont has been defined as 60 square feet of basal area per acre.

Table 6. — *Area of commercial forest land in Vermont, by stocking classes of growing-stock trees and by stand-size classes, 1966*

(In thousands of acres)

Stocking class[1] (percent of normal stocking)[2]	All stands	Saw-timber stands	Pole-timber stands	Sapling-and-seedling stands	Non-stocked areas
70 or more	2,871	1,301	1,015	555	—
40 to 70	1,088	396	368	324	—
10 to 40	297	71	117	109	—
Less than 10	39	—	—	—	39
All classes	4,295	1,768	1,500	988	39

[1] In terms of growing-stock trees.

[2] For definition of normal stocking see table 5.

Table 7. — *Area of commercial forest land in Vermont, by area-condition and ownership classes, 1966*

(In thousands of acres)

Area-condition class[1]	All ownerships	Public	Forest industry	Farmer and misc. private
1	—	—	—	—
2	16	1	6	9
3	—	—	—	—
4	173	3	31	139
5	1,150	60	154	936
6	1,977	193	374	1,410
7	979	142	113	724
All classes	4,295	399	678	3,218

[1] Area-condition classes are briefly described as follows:

Class 1 — Areas 100 percent or more stocked with desirable trees and not overstocked.

Class 2 — Areas 100 percent or more stocked with desirable trees and overstocked.

Class 3 — Areas 60 to 100 percent stocked with desirable trees, and with less than 30 percent of the area controlled by growing-stock trees, rough and/or rotten trees, inhibiting vegetation, or nonstockable conditions.

Class 4 — Areas 60 to 100 percent stocked with desirable trees, and with more than 30 percent of the area controlled by other trees and/or conditions that prevent occupancy by desirable trees.

Class 5 — Areas less than 60 percent stocked with desirable trees, but with 100 percent or more stocking with growing-stock trees.

Class 6 — Areas less than 60 percent stocked with desirable trees, but with 60 to 100 percent stocking with growing-stock trees.

Class 7 — Areas less than 60 percent stocked with desirable trees, and with less than 60 percent stocking with growing-stock trees.

Table 8. — *Area of commercial forest land in Vermont, by potential growth-per-acre and ownership classes, 1966*

(In thousands of acres)

Growth-per-acre class	All ownerships	Public	Forest industry	Farmer and misc. private
More than 120 cubic feet	812	29	126	657
85 to 120 cubic feet	811	68	138	605
50 to 85 cubic feet	1,539	159	224	1,156
Less than 50 cubic feet	1,133	143	190	800
All classes	4,295	399	678	3,218

Table 9 — *Area of commercial forest land in Vermont, by forest types and ownership classes, 1966*

(In thousands of acres)

Forest type	All ownerships	Public ownerships	Private ownerships
White-red pine	600	4	596
Spruce-fir	749	26	723
Oak-pine	63	2	61
Oak-hickory	75	6	69
Elm-ash-red maple	555	22	533
Maple-beech-birch	2,004	323	1,681
Aspen-birch	249	16	233
All types	4,295	399	3,896

Table 10. — *Area of noncommercial forest land in Vermont, by forest type, 1966*

(In thousands of acres)

Forest type	All areas	Productive-reserved areas	Unproductive areas
White-red pine	1	1	—
Spruce-fir	14	1	13
Oak-pine	1	—	1
Oak-hickory	—	—	—
Elm-ash-red maple	3	1	2
Maple-beech-birch	4	4	—
Aspen-birch	4	—	4
All types	27	7	20

Table 11. — *Sampling errors, in percent, for major area breakdowns in Vermont, 1966*

Table No.	Area breakdown classification	Sampling error	Table No.	Area breakdown classification	Sampling error
		Percent			*Percent*
1	Forest land area:		7	Area-condition class:	
	Commercial	1		1	—
	Unproductive	—		2	70
	Total	1		3	—
2	Ownership of commercial forest land*			4	23
				5	7
	Farmer-owned	6		6	5
	Misc. private	5		7	8
	Farmer and misc. private	2	8	Potential growth per-acre class (cubic feet):	
3	Stand-size class:			More than 129	9
	Sawtimber	5		85 to 120	9
	Poletimber	6		50 to 85	6
	Sapling-and-seedling	8		Less than 50	7
	Nonstocked	54	9	Forest types:	
4	Stand-volume per acre (board feet):			White-red pine	11
				Spruce-fir	10
	Less than 1,500	4		Loblolly-shortleaf pine	—
	1,500 to 5,000	5		Oak-pine	41
	More than 5,000	16		Oak-hickory	31
6	Stocking class (percent):			Oak-gum-cypress	—
	70 or more	3		Elm-ash-red maple	12
	40 to 70	8		Maple-beech-birch	4
	10 to 40	16		Aspen-birch	18
	Less than 10	53			

* There are no sampling errors for areas in public ownership because acreages were obtained from public records, nor for forest industry because acreages were obtained directly.

Table 12. — *Number of growing-stock trees on commercial forest land in Vermont, by diameter classes and by softwoods and hardwoods, 1966*

(In thousands of trees)

D.b.h. class (inches)	All species	Softwood	Hardwood
1.0 to 2.9	803,163	370,787	432,376
3.0 to 4.9	408,768	199,917	208,851
5.0 to 6.9	238,246	105,039	133,207
7.0 to 8.9	142,224	57,484	84,740
9.0 to 10.9	82,126	29,594	52,532
11.0 to 12.9	38,220	12,386	25,834
13.0 to 14.9	21,783	6,864	14,919
15.0 to 16.9	9,778	2,826	6,952
17.0 to 18.9	4,854	1,195	3,659
19.0 to 28.9	4,819	1,295	3,524
29.0 and larger	145	19	126
All classes	1,754,126	787,406	966,720

Table 13. — *Number of rough and/or rotten and growing-stock trees on commercial forest land in Vermont, by diameter groups and by softwoods and hardwoods, 1966*

(In thousands of trees)

D.b.h. class (inches)	All trees[1]	Rough and/or rotten trees	Growing-stock trees
Softwoods:			
5.0 to 8.9	183,220	20,697	162,523
9.0 to 18.9	63,991	11,126	52,865
19.0 and larger	2,113	799	1,314
Total	249,324	32,622	216,702
Hardwoods:			
5.0 to 10.9	341,557	120,835	220,722
11.0 to 18.9	130,188	29,067	101,121
19.0 and larger	9,542	5,892	3,650
Total	481,287	155,794	325,493
All species	730,611	188,416	542,195

[1] Number of salvable dead trees is neglible in Vermont; therefore this item is omitted from this table.

Table 14. — *Volume of timber on commercial forest land in Vermont, by class of timber and by softwoods and hardwoods, 1966*

(In millions of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	1,470	647	823
Upper-stem portion	268	89	179
Total	1,738	736	1,002
Poletimber trees	2,027	684	1,343
All growing-stock trees	3,765	1,420	2,345
Rough trees:			
Sawtimber size	190	78	112
Poletimber size	116	29	87
Total	306	107	199
Rotten trees:			
Sawtimber size	106	10	96
Poletimber size	55	4	51
Total	161	14	147
Total, all timber	4,232	1,541	2,691

Sampling errors for major breakdowns of timber volume for all tables are given in table 20.

Table 15. — *Volume of growing stock and sawtimber on commercial forest land in Vermont, by ownership classes and by softwoods and hardwoods, 1966*

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Million cubic feet			*Million board feet*[1]		
Public	356	83	273	765	173	592
Forest industry	614	209	405	1,108	378	730
Other private	2,795	1,128	1,667	4,728	2,076	2,652
All ownerships	3,765	1,420	2,345	6,601	2,627	3,974

[1] International ¼-inch rule.

Table 16. — *Volume of growing stock and sawtimber on commercial forest land in Vermont, by stand-size classes and by softwoods and hardwoods, 1966*

Stand-size class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Million cubic feet			*Million board feet*[1]		
Sawtimber stands	2,065	791	1,274	4,966	1,966	3,000
Poletimber stands	1,418	471	947	1,352	504	848
Sapling-and-seedling stands	281	158	123	279	157	122
Nonstocked area	1	—	1	4	—	4
Total	3,765	1,420	2,345	6,601	2,627	3,974

[1] International ¼-inch rule.

Table 17. — *Volume of growing stock on commercial forest land in Vermont, by species and diameter classes, 1966*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
White and red pine[1]	296	61	55	41	33	34	19	13	38	2	—
Spruces	496	119	116	95	64	51	25	12	14	—	—
Balsam fir	254	90	74	55	22	10	2	1	—	—	—
Hemlock	316	68	60	64	43	31	24	15	11	—	—
Cedar and tamarack[2]	58	24	18	10	3	2	1	—	—	—	—
Total softwoods	1,420	362	323	265	165	128	71	41	63	2	—
Select white oaks	8	1	1	—	—	1	1	2	2	—	—
Select red oaks	77	9	9	10	13	15	8	7	6	—	—
Other oaks	8	—	—	3	4	1	—	—	—	—	—
Hickory	12	4	4	1	1	1	1	—	—	—	—
Yellow birch	299	49	47	55	43	35	27	15	25	3	—
Paper birch	227	57	57	50	30	14	9	5	4	—	1
Sugar maple	829	144	172	165	112	87	55	36	54	4	—
Other maples	276	45	59	69	42	29	15	9	8	—	—
Beech	226	29	40	28	36	38	23	15	17	—	—
Ash	147	22	28	33	25	18	8	6	6	1	—
Black cherry	43	9	11	11	3	3	3	1	2	—	—
Aspen	88	18	22	22	10	10	4	1	1	—	—
Basswood	21	2	4	5	3	3	—	1	3	—	—
Other hardwoods	84	11	18	18	15	6	4	4	6	2	—
Total hardwoods	2,345	400	472	470	337	261	158	102	134	10	1
All species	3,765	762	795	735	502	389	229	143	197	12	1

[1] Includes about 1 percent red pine.
[2] Includes 4.8 million cubic feet of tamarack.

Table 18. — *Volume of sawtimber on commercial forest land in Vermont, by species and diameter classes, 1966*

(In millions of board feet) [1]

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
White and red pine[2]	654	122	118	129	73	53	154	4	1
Spruces	959	281	237	210	110	55	66	—	—
Balsam fir	294	162	81	39	9	3	—	—	—
Hemlock	673	189	151	122	97	66	48	—	—
Cedar and tamarack[3]	47	27	11	6	3	—	—	—	—
Total softwoods	2,627	781	598	506	292	177	268	4	1
Select white oaks	31	—	2	5	5	9	10	—	—
Select red oaks	197	—	42	56	35	35	29	—	—
Other oaks	18	—	12	6	—	—	—	—	—
Hickory	10	—	4	3	3	—	—	—	—
Yellow birch	597	—	143	135	118	72	115	14	—
Paper birch	238	—	96	55	40	23	22	—	2
Sugar maple	1,399	—	369	338	244	168	258	21	1
Other maples	393	—	138	112	64	40	38	1	—
Beech	519	—	121	149	103	68	78	—	—
Ash	247	—	80	69	37	27	30	4	—
Black cherry	50	—	12	13	11	6	8	—	—
Aspen	100	—	33	40	17	3	7	—	—
Basswood	37	—	11	12	—	2	12	—	—
Other hardwoods	138	—	47	22	18	17	27	7	—
Total hardwoods	3,974	—	1,110	1,015	695	470	634	47	3
All species	6,601	781	1,708	1,521	987	647	902	51	4

[1] International ¼-inch rule.
[2] Includes about 1 percent red pine.
[3] Includes 8.2 million board feet of tamarack.

Table 19. — *Volume of sawtimber on commercial forest land in Vermont, by species and quality classes, 1966*

(In millions of board feet) [1]

Species	All classes	Standard-lumber logs			Other[2]
		Grade 1	Grade 2	Grade 3	
Softwoods:					
White and red pines	654	17	93	337	207
Other softwoods[3]	1,973	—	—	—	—
Total	2,627	17	93	337	207
Hardwoods					
Select white and red oaks	228	47	68	90	23
Other oaks	18	1	3	11	3
Hickory	10	—	2	3	5
Yellow birch	597	89	201	275	32
Paper birch	238	20	70	121	27
Sugar maple	1,399	206	395	647	151
Other maples	393	19	116	193	65
Beech	519	19	128	322	50
Ash	247	59	72	78	38
Black cherry	50	7	12	21	10
Basswood	38	4	8	17	9
Other hardwoods	237	23	51	137	26
Total	3,974	494	1,126	1,915	439
All species	6,601	511	1,219	2,252	—

[1] International ¼-inch rule.

[2] For white and red pines "Other" is Grade 4, for hardwoods "Other" is Tie and Timber Log Grade. For a discussion of log grade see the appendix.

[3] Other softwoods were not graded.

Table 20. — *Sampling errors, in percent, for major timber volume breakdowns in Vermont, 1966*

Table No.	Volume breakdown classification	Sampling error
		Percent
14	Class of timber (cubic feet):	
	Softwood growing stock	5
	Hardwood growing stock	3
	Sawtimber trees	3
	Poletimber trees	3
	All growing stock	2
	Rough trees	5
	Rotten trees	5
	All live trees	2
15	Ownership classes:	
	Growing stock (cubic feet)	
	Other public	5
	Forest industry	11
	Farmer and misc. private	3
	Sawtimber (board feet)	
	Other public	5
	Forest industry	13
	Farmer and misc. private	4
	Softwood sawtimber	6
	Hardwood sawtimber	4
	All sawtimber	2
16	Stand-size classes:	
	Growing stock (cubic feet)	
	Sawtimber stands	5
	Poletimber stands	7
	Sapling-and-seedling	12
	Nonstocked	45
	Sawtimber (board feet)	
	Sawtimber stands	3
	Poletimber stands	9
	Sapling-and-seedling	15
	Nonstocked	52

Table No.	Volume breakdown classification	Sampling error	
		Cubic feet	Board feet
		Percent	
17-18	Species:		
	White and red pine	14	16
	Spruce	9	13
	Balsam fir	11	17
	Hemlock	11	12
	Cedar	25	31
	Select white oaks	57	69
	Select red oaks	20	26
	Chestnut	68	66
	Yellow birch	8	10
	Hickory	32	69
	Soft maples	9	11
	Beech	9	10
	Paper birch	10	17
	Hard maple	6	7
	Ash, walnut, cherry	12	20
	Aspen	17	23
	Other hardwoods	15	20
	Basswood	25	30
17-18	Diameter class (inches):		
	5.0 to 6.9	4	—
	7.0 to 8.9	4	—
	9.0 to 10.9[1]	3	7
	11.0 to 12.9	4	4
	13.0 to 14.9	5	4
	15.0 to 16.9	6	5
	17.0 to 18.9	7	6
	19.0 to 28.9	8	7
	29.0 and larger	24	23

[1] Board-foot sampling error for this class is for softwoods only.

Table 21. — *Average net annual growth and annual cut of growing stock and sawtimber on commercial forest land in Vermont, by species, 1948-1965*

Species	Growing stock		Sawtimber	
	Net annual growth	Annual timber cut	Net annual growth	Annual timber cut
	Thousand cubic feet		*Thousand board feet*[1]	
Softwoods:				
White and red pine	12,284	6,030	34,204	33,090
Spruce and fir	18,006	10,207	36,000	44,766
Hemlock and other softwoods	9,010	10,263	21,396	51,280
Total	39,300	26,500	91,600	129,136
Hardwoods:				
Oaks	2,554	1,712	7,700	4,818
Yellow birch	2,781	9,015	6,268	31,095
Hard maple	18,203	9,772	38,905	26,717
Soft maples	4,025	2,633	10,024	2,362
Ash	2,104	1,188	6,305	3,592
Other hardwoods	14,033	10,380	13,898	28,198
Total	43,700	34,700	83,100	96,682
All species	83,000	61,200	174,700	225,818

[1] International ¼-inch rule.

Sampling errors for tables 21 through 26(B) are shown in table 27.

Table 22. — *Average net annual growth and annual cut of growing stock on commercial forest land in Vermont, by ownership classes and by softwoods and hardwoods, 1948-1965*

(In thousands of cubic feet)

Ownership class	Net annual growth			Annual timber cut		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Public	4,400	1,300	3,100	3,900	600	3,300
Forest industry	15,700	8,500	7,200	6,100	2,100	4,000
Farmer and misc. private	62,900	29,500	33,400	51,200	23,800	27,400
All ownerships	83,000	39,300	43,700	61,200	26,500	34,700

Table 23. — *Average net annual growth and annual cut of sawtimber on commercial forest land in Vermont, by ownership classes and by softwoods and hardwoods, 1948-1965*

(In thousands of board feet) [1]

Ownership class	Net annual growth			Annual timber cut		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Public	10,800	3,900	6,900	9,165	2,537	6,628
Forest industry	19,600	4,100	15,500	24,059	10,689	13,370
Farmer and misc. private	144,300	83,600	60,700	192,594	115,910	76,684
All ownerships	174,700	91,600	83,100	225,818	129,136	96,682

[1] International ¼-inch rule.

Table 24. — *Components of average net annual growth[1] of growing stock and sawtimber on commercial forest land in Vermont, by species group, 1948-1965*

Components	All species	Softwoods	Hardwoods
		GROWING STOCK *Thousand cubic feet*	
Gross growth	109,200	49,300	59,900
Annual mortality	26,200	10,000	16,200
Net annual growth of growing stock	83,800	39,300	43,700
		SAWTIMBER *Thousand board feet*[2]	
Gross growth	220,700	110,100	110,600
Annual mortality	46,000	18,500	27,500
Net annual growth sawtimber	174,700	91,600	83,100

[1] Including growth on trees that were cut.

[2] International ¼-inch rule.

Table 25. — *Average annual mortality of growing stock and sawtimber on commercial forest land in Vermont, by species, 1948-1965*

Species	Growing stock	Sawtimber
	Thousand cubic feet	*Thousand board feet*[1]
Softwoods:		
White and red pine	940	1,006
Spruce and balsam fir	7,235	13,194
Other softwoods	1,830	4,254
Total	10,005	18,454
Hardwoods:		
Select oaks	115	547
Other oaks	228	486
Yellow birch	2,551	2,486
Paper birch	2,372	4,995
Sugar maple	3,065	6,085
Soft maple	1,561	1,156
Ash	1,203	2,086
Other hardwoods	5,117	9,686
Total	16,212	27,527
All species	26,217	45,981

[1] International ¼-inch rule.

Table 26 (A). — *Average annual mortality of growing stock and sawtimber on commercial forest land in Vermont, by ownership classes and by softwoods and hardwoods, 1948-1965*

Ownership	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet*[1]		
Public	3,654	1,755	1,899	8,887	4,200	4,687
Forest industry	4,348	1,795	2,553	7,675	2,397	5,278
Farmer and misc. private	18,215	6,455	11,760	29,419	11,857	17,562
All ownerships	26,217	10,005	16,212	45,981	18,454	27,527

[1] International ¼-inch rule.

Table 26 (B). — *Average annual mortality of growing stock and sawtimber on commercial forest land in Vermont, by causes and by softwoods and hardwoods, 1948-1965*

Cause of death	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet*[1]		
Fire	—	—	—	—	—	—
Insects	437	198	239	1,357	125	1,232
Diseases	13,776	3,428	10,348	21,360	8,257	13,103
Other	4,260	1,612	2,648	8,804	2,853	5,951
Unknown	7,744	4,767	2,977	14,460	7,219	7,241
All causes	26,217	10,005	16,212	45,981	18,454	27,527

[1] International ¼-inch rule.

Table 27. — *Sampling errors, in percent, for major breakdowns of average annual growth, cut, and mortality of growing stock and sawtimber, in Vermont, 1948-1965*

Table No.	Breakdown classification	Sampling error
		Percent
21	Growth in cubic feet:	
	Softwoods	20
	Hardwoods	33
	All species	25
	Cut in cubic feet:	
	Softwoods	23
	Hardwoods	21
	All species	15
	Growth in board feet:	
	Softwoods	26
	Hardwoods	40
	All species	24
	Cut in board feet:	
	Softwoods	25
	Hardwoods	23
	All species	17
22	Growth in cubic feet:	
	Public	*
	Forest industry	66
	Farmer and misc. private	27
	Cut in cubic feet:	
	Public	53
	Forest Industry	55
	Farmer and misc. private	17
23	Growth in board feet:	
	Public	*
	Forest industry	54
	Farmer and misc. private	26
	Cut in board feet:	
	Public	53
	Forest industry	56
	Farmer and misc. private	20

Table No.	Breakdown classification	*Cubic feet*	*Board feet*
		Percent	
25	Mortality by species group:		
	Softwoods	19	22
	Hardwoods	13	21
	All species	11	16
26 (A)	Mortality by owner:		
	Public	31	40
	Forest industry	37	52
	Farmer and misc. private	13	21
26 (B)	Mortality by cause:		
	Fire	—	—
	Insect	64	91
	Disease	15	22
	Other	25	35
	Unknown	23	29

* There are no sampling errors for areas in public ownership because acreages were obtained from public records, nor for forest industry because acreages were obtained directly.

Table 28. — *Total output of timber products, by products, by type of material used, and by softwoods and hardwoods, in Vermont, 1965*

Product and species group	Total output in standard units		Output from roundwood		Output from plant byproducts:
	Unit	Number	Standard units	M cubic feet	Standard units
Sawlogs:					
Softwood	M board feet[1]	49,736	49,736	8,883	—
Hardwood	M board feet[1]	65,464	65,464	10,754	—
Total	M board feet[1]	115,200	115,200	19,637	—
Veneer logs:					
Softwood	M board feet	—	—	—	—
Hardwood	M board feet	15,032	15,032	2,469	—
Total	M board feet	15,032	15,032	2,469	—
Pulpwood:					
Softwood	Standard cords[2]	93,100	87,000	6,960	6,100
Hardwood	Standard cords[2]	57,000	26,000	2,080	31,000
Total	Standard cords[2]	150,100	113,000	9,040	37,100
Poles:					
Softwood	M pieces	12	12	23	—
Hardwood	M pieces	—	—	—	—
Total	M pieces	12	12	23	—
Misc. Industrial wood:[3]					
Softwood	M cubic feet	293	293	293	—
Hardwood	M cubic feet	4,531	4,531	4,531	—
Total	M cubic feet	4,824	4,824	4,824	—

CONTINUED

Table 28. — *continued*

Product and species group	Total output in standard units		Output from roundwood		Output from plant byproducts:
	Unit	Number	Standard units	M cubic feet	Standard units
Posts (round and split):					
Softwood	M pieces	62	62	45	—
Hardwood	M pieces	12	12	8	—
Total	M pieces	74	74	53	—
Fuelwood:					
Softwood	Standard cords	6,462	—	—	6,462
Hardwood	Standard cords	78,370	73,420	5,874	4,950
Total	Standard cords	84,832	73,420	5,874	11,412
All products:					
Softwood	M cubic feet	17,209	16,204	16,204	1,005
Hardwood	M cubic feet	28,592	25,716	25,716	2,876
Total	M cubic feet	45,801	41,920	41,920	3,881

[1] International ¼-inch rule.

[2] Rough wood basis (for example, chips converted to equivalent standard cords).

[3] Includes hewn ties, excelsior bolts, hingle bolts, turnery bolts, chemical wood, and the like.

Table 29. — *Total output of roundwood products, by source and by softwoods and hardwoods, in Vermont, 1965*

(In thousands of cubic feet)

Source	All species	Softwoods	Hardwoods
Growing-stock trees[1]			
Sawtimber	25,977	12,404	13,573
Poletimber	9,891	2,634	7,257
Total	35,868	15,038	20,830
Rough and/or rotten trees[1]	1,257	117	1,140
Salvable dead trees[1]	1,137	22	1,115
Other sources[2]	3,658	1,027	2,631
All sources	41,920	16,204	25,716

[1] On commercial forest land.

[2] Includes noncommercial forest land, nonforest land like fence rows, trees less than 5.0 inches in diameter, and tree tops and limbs.

Table 30. — *Timber cut from growing stock on commercial forest land, by products and logging residues, and by softwoods and hardwoods, in Vermont, 1965*

(In thousands of cubic feet)

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	18,027	8,238	9,789
Veneer logs and bolts	2,340	—	2,340
Cooperage logs and bolts	—	—	—
Pulpwood	8,311	6,464	1,847
Piling	—	—	—
Poles	22	22	—
Mine timbers	—	—	—
Misc. industrial wood	4,295	272	4,023
Posts	49	42	7
Fuelwood	2,824	—	2,824
All products	35,868	15,038	20,830
Logging residues	6,323	1,692	4,631
Timber cut	42,191	16,730	25,461

Table 31. — *Timber cut from live sawtimber on commercial forest land, by products and logging residues, and by softwoods and hardwoods, Vermont, 1965*

(In thousands of board feet) [1]

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	85,065	34,670	50,395
Veneer logs and bolts	12,046	—	12,046
Cooperage logs and bolts	—	—	—
Pulpwood	16,419	15,213	1,206
Piling	—	—	—
Poles	89	89	—
Mine timbers	—	—	—
Misc. industrial wood	3,269	641	2,628
Posts	101	98	3
Fuelwood	2,528	—	2,528
All products	119,517	50,711	68,806
Logging residues	10,203	2,554	7,649
Timber cut	129,720	53,265	76,455

[1] International ¼-inch rule.

Table 32. — *Volume of plant residues, by industrial source and type of residue, and by softwoods and hardwoods, in Vermont, 1965*

(In thousands of cubic feet)

Industrial source	Species and character of residues								
	All species			Softwoods			Hardwoods		
	Total	Coarse[1]	Fine[2]	Total	Coarse	Fine	Total	Coarse	Fine
Lumber industry	3,337	2,070	1,267	497	16	481	2,840	2,054	786
Other primary industries	828	259	569	43	14	29	785	245	540
All industries	4,165	2,329	1,836	540	30	510	3,625	2,299	1,326

[1] Unused material suitable for chipping, like slabs, edgings, and veneer cores.
[2] Unused material not suitable for chipping, like sawdust and shavings.

Table 33. — *Timber growth projections for Vermont, 1966-1996*

Species group	1966 (Inventory year)	1976	1986	1996
		GROWING STOCK *Thousand cubic feet*		
Softwoods:				
Cut	19,600	15,500	15,500	15,500
Growth	46,500	55,700	66,000	77,800
Inventory	1,427,600	1,756,800	2,209,100	2,778,700
Hardwoods:				
Cut	22,200	19,300	19,300	19,300
Growth	46,900	49,600	53,000	56,600
Inventory	2,346,500	2,619,200	2,939,800	3,295,400
All species:				
Cut	41,800	34,800	34,800	34,800
Growth	93,400	105,300	119,000	134,400
Inventory	3,774,100	4,376,000	5,148,900	6,074,100
		SAWTIMBER *Thousand board feet*[2]		
Softwoods:				
Cut	59,000	45,000	45,000	45,000
Growth	107,000	132,000	168,000	212,400
Inventory	2,653,000	3,306,000	4,330,000	5,744,000
Hardwoods:				
Cut	60,000	50,000	50,000	50,000
Growth	90,000	101,500	116,800	134,000
Inventory	3,974,000	4,370,000	4,950,000	5,687,000
All species:				
Cut	119,000	95,000	95,000	95,000
Growth	197,000	234,000	285,200	347,200
Inventory	6,627,000	7,675,000	9,280,000	11,431,000

[1] For a discussion of the assumptions used in this projection see section "Timber Suppl Outlook."

[2] International ¼-inch rule.

Table 34. — *Land area of Vermont, by land classes and geographic units, 1966*

(In thousands of acres)

Land class	Northern[1]	Southern[2]	National forest	State forests	Total
Commercial forest land	2,072.1	1,919.3	219.9	83.3	4,294.6
Unproductive forest land	3.5	1.8	7.2	7.7	20.2
Productive-reserved forest land	2.2	.4	2.3	2.0	6.9
Total forest land	2,077.8	1,921.5	229.4	93.0	4,321.7
Nonforest land	754.7	804.1	3.1	3.7	1,614.9[3]
All land	2,832.5	2,725.6	232.5	96.7	5,936.6
			Sampling errors, in percent		
Commercial forest land	2	2	—	—	1

[1] Includes Caledonia, Essex, Franklin, Lamoille, Orange, Orleans, and Washington Counties, but excludes areas of State forests and National forest.

[2] Includes Addison, Bennington, Chittenden, Rutland, Windham, and Windsor Counties, but excludes areas of State forests and National forest.

[3] Includes 49,000 acres in Grand Isle County, which was not sampled.

Table 35. — *Area of commercial forest land in Vermont by ownership classes and geographic units, 1966*

(In thousands of acres)

Ownership class	Northern	Southern	National forest	State forests	Total
National forest	—	—	219.9	—	219.9
Other Federal	0.8	2.9	—	—	3.7
State	12.2	36.1	—	83.3	131.6
County and municipal	19.2	24.5	—	—	43.7
Total public	32.2	63.5	219.9	83.3	398.9
Pulp and paper industry	233.8	83.0	—	—	316.8
Lumber industry	189.1	90.4	—	—	279.5
Other forest industry	40.0	42.0	—	—	82.0
Total forest industry	462.9	215.4	—	—	678.3
Farmer-owned	784.4	567.2	—	—	1,351.6
Misc. private	792.6	1,073.2	—	—	1,865.8
All ownerships	2,072.1	1,919.3	219.9	83.3	4,294.6
			Sampling errors, in percent [1]		
Forest industry	11	19	—	—	10
Farmer-owned	8	10	—	—	6
Misc. private	8	6	—	—	5

[1] No sampling errors for area in public ownership. Areas were obtained from records.

Table 36. — *Area of commercial forest land in Vermont, by stand-size classes and geographic units, 1966*

(In thousands of acres)

Stand-size class	Northern	Southern	National forest	State forests	Total
Sawtimber	825.5	786.5	122.2	33.6	1,767.8
Poletimber stands	660.8	748.2	61.4	29.4	1,499.8
Sapling-and-seedling stands	547.9	384.6	36.3	19.5	988.3
Nonstocked areas	37.9	—	—	.8	38.7
All classes	2,072.1	1,919.3	219.9	83.3	4,294.6
			Sampling errors, in percent		
Sawtimber stands	7	8	9	8	5
Poletimber stands	9	8	19	9	6
Sapling-and-seedling stands	11	14	23	20	8
Nonstocked areas	57	—	—	40	54
All classes	2	2	—	1	1

Table 37. — *Area of commercial forest land in Vermont, by stocking classes of growing-stock trees and geographic units, 1966*

(In thousands of acres)

Stocking percentage class	Northern	Southern	National forest	State forests	Total
70 percent or more	1,456.6	1,242.3	116.3	56.3	2,871.5
40 to 70 percent	426.4	554.2	86.4	20.5	1,087.5
10 to 40 percent	151.2	122.8	17.2	5.7	296.9
Less than 10 percent	37.9	—	—	.8	38.7
All classes	2,072.1	1,919.3	219.9	83.3	4,294.6

Table 38. — *Area of Commercial forest land in Vermont, by area-condition classes and geographic units, 1966*

(In thousands of acres)

Area-condition class[1]	Northern	Southern	National forest	State forests	Total
1	—	—	—	—	—
2	15.1	—	—	0.5	15.6
3	—	—	—	—	—
4	139.8	30.8	—	2.6	173.2
5	524.9	577.3	28.0	19.8	1,150.0
6	918.0	911.5	119.7	27.4	1,976.6
7	474.3	399.7	72.2	33.0	979.2
All classes	2,072.1	1,919.3	219.9	83.3	4,294.6

[1] See table 7 for description of area-condition classes.

Table 39. — *Area of commercial forest land in Vermont, by forest types and geographic units, 1966*

(In thousands of acres)

Forest type	Northern	Southern	National forest	State forests	Total
White-red pine	270.9	324.4	2.3	2.2	599.8
Spruce-fir	570.7	152.4	18.0	8.0	749.1
Oak-pine	8.2	52.0	—	2.5	62.7
Oak-hickory	9.2	60.2	4.7	.9	75.0
Elm-ash-red maple	225.6	318.7	5.0	5.7	555.0
Maple-beech-birch	882.3	884.0	180.9	57.2	2,004.4
Aspen-paper birch	105.2	127.6	9.0	6.8	248.6
All types	2,072.1	1,919.3	219.9	83.3	4,294.6
			Sampling errors, in percent		
White-red pine	18	14	100	45	11
Spruce-fir	11	24	36	23	10
Oak-pine	100	47	—	40	41
Oak-hickory	100	36	70	71	31
Elm-ash-red maple	20	16	72	28	12
Maple-beech-birch	7	7	5	5	4
Aspen-paper birch	27	27	49	25	18

Table 40. — *Volume of timber on commercial forest land in Vermont, by class of timber and geographic units, 1966*

(In millions of cubic feet)

Class of timber	Northern	Southern	National forest	State forests	Total
Sawtimber trees:					
Sawlog portion	674.2	668.8	91.6	35.5	1,470.1
Upper-stem portion	117.8	125.1	18.3	6.7	267.9
Total	792.0	793.9	109.9	42.2	1,738.0
Poletimber trees	964.8	929.1	88.6	44.7	2,027.2
All growing-stock trees	1,756.8	1,723.0	198.5	86.9	3,765.2
Rough trees:					
Sawtimber size	75.5	102.4	11.1	.3	189.3
Poletimber size	48.7	55.7	10.1	1.7	116.2
Total	124.2	158.1	21.2	2.0	305.5
Rotten trees:					
Sawtimber size	50.7	37.2	12.7	5.1	105.7
Poletimber size	24.9	20.8	4.9	5.2	55.8
Total	75.6	58.0	17.6	10.3	161.5
Total, all timber	1,956.6	1,939.1	237.3	99.2	4,232.2
		Sampling errors, in percent			
Sawtimber trees	5	5	6	6	3
Poletimber trees	4	4	8	6	3
All growing-stock trees	3	3	3	4	2
Rough trees	8	7	8	13	5
Rotten trees	7	8	8	7	5

Table 41. — *Volume of growing stock on commercial forest land in Vermont, by ownership classes, softwoods and hardwoods, and geographic units, 1966*

(In millions of cubic feet)

Ownership and species group	Northern	Southern	Other	Total
National forest:				
Softwoods	—	—	39.4	39.4
Hardwoods	—	—	159.1	159.1
Total	—	—	198.5	198.5
State forests				
Softwoods	—	—	25.0	25.0
Hardwoods	—	—	61.9	61.9
Total	—	—	86.9	86.9
Other public:				
Softwoods	6.1	12.0	—	18.1
Hardwoods	17.7	35.0	—	52.7
Total	23.8	47.0	—	70.8
Forest Industry:				
Softwoods	179.4	29.6	—	209.0
Hardwoods	276.3	128.7	—	405.0
Total	455.7	158.3	—	614.0
Other private:				
Softwoods	645.9	482.3	—	1,128.2
Hardwoods	631.4	1,035.4	—	1,666.8
Total	1,277.3	1.517.7	—	2,795.0
All ownerships:				
Softwoods	831.4	523.9	64.4	1,419.7
Hardwoods	925.4	1,199.1	221.0	2,345.5
Total	1,756.8	1,723.0	285.4	3,765.2
		Sampling errors, in percent		
National forest	—	—	3	3
State forests	—	—	4	4
Other public	**	49	—	46
Forest industry	13	21	—	11
Other private	6	4	—	3

** Over 100 percent sampling error.

Table 42. — *Volume of sawtimber on commercial forest land in Vermont, by ownership classes, softwoods and hardwoods, and geographic units, 1966*

(In millions of cubic feet)

Ownership and species group	Northern	Southern	Other	Total
National forest:				
Softwoods	—	—	71.7	71.7
Hardwoods	—	—	402.7	402.7
Total	—	—	474.4	474.4
State forests:				
Softwoods	—	—	58.4	58.4
Hardwoods	—	—	116.0	116.0
Total	—	—	174.4	174.4
Other public:				
Softwoods	14.6	28.8	—	43.4
Hardwoods	24.4	48.2	—	72.6
Total	39.0	77.0	—	116.0
Forest industry:				
Softwoods	334.3	43.2	—	377.5
Hardwoods	486.3	244.0	—	730.3
Total	820.6	287.2	—	1,107.8
Other private:				
Softwoods	1,059.9	1,015.7	—	2,075.6
Hardwoods	970.1	1,682.0	—	2,652.1
Total	2,030.0	2,697.7	—	4,727.7
All ownerships:				
Softwoods	1,408.8	1,087.7	130.1	2,626.6
Hardwoods	1,480.8	1,974.2	518.7	3,973.7
Total	2,889.6	3,061.9	648.8	6,600.3
		Sampling errors, in percent		
National forest	—	—	4	4
State forests	—	—	6	6
Other public	**	52	—	51
Forest industry	15	24	—	13
Other private	7	4	—	4

** Over 100 percent sampling error.

Table 43. — *Volume of growing stock on commercial forest land in Vermont, by stand-size classes, softwoods and hardwoods, and geographic units, 1966*

(In millions of cubic feet)

Standard-size class and species group	Northern	Southern	National forest	State forests	Total
Sawtimber stands:					
Softwoods	450.2	311.1	16.0	14.1	791.4
Hardwoods	500.2	630.0	110.6	32.9	1,273.7
Total	950.4	941.1	126.6	47.0	2,065.1
Poletimber stands:					
Softwoods	286.0	154.8	21.9	8.1	470.8
Hardwoods	374.8	507.0	39.8	25.7	947.3
Total	660.8	661.8	61.7	33.8	1,418.1
Other stands:					
Softwoods	95.2	58.0	1.5	2.8	157.5
Hardwoods	50.4	62.1	8.7	3.3	124.5
Total	145.6	120.1	10.2	6.1	282.0
All stands:					
Softwoods	831.4	523.9	39.4	25.0	1,419.7
Hardwoods	925.4	1,199.1	159.1	61.9	2,345.5
Total	1,756.8	1,723.0	198.5	86.9	3,765.2
			Sampling errors, in percent		
Sawtimber stands	8	7	10	9	5
Poletimber stands	10	10	19	12	7
Other stands	17	19	29	22	12
All stands:					
Softwoods	7	8	20	15	5
Hardwoods	6	4	6	5	3
Total	3	3	4	4	2

Table 44. — *Volume of sawtimber on commercial forest land in Vermont, by stand-size classes, softwoods and hardwoods, and geographic units, 1966*

(In millions of board feet)

Stand-size class and species group	Northern	Southern	National forest	State forests	Total
Sawtimber stands:					
Softwoods	1,051.8	818.3	51.8	43.7	1,965.6
Hardwoods	1,120.3	1,461.0	331.9	86.7	2,999.9
Total	2,172.1	2,279.3	383.7	130.4	4,965.5
Poletimber stands:					
Softwoods	285.0	188.0	19.5	11.1	503.6
Hardwoods	317.3	452.0	53.3	25.8	848.4
Total	602.3	640.0	72.8	36.9	1,352.0
Other stands:					
Softwoods	72.0	81.4	.4	3.6	157.4
Hardwoods	43.2	61.2	17.5	3.5	125.4
Total	115.2	142.6	17.9	7.1	282.8
All stands:					
Softwoods	1,408.8	1,087.7	71.7	58.4	2,626.6
Hardwoods	1,480.8	1,974.2	402.7	116.0	3,973.7
Total	2,889.6	3,061.9	474.4	174.4	6,600.3
			Sampling errors, in percent		
Sawtimber stands	5	5	7	10	3
Poletimber stands	14	14	26	13	9
Other stands	22	23	37	26	15
All stands:					
Softwoods	8	10	25	14	6
Hardwoods	8	6	6	7	4
Total	3	3	4	6	2

Table 45. — *Volume of growing stock on commercial forest land in the Northern geographic unit, in Vermont, by species and diameter classes, 1966*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White and red pines	110.0	21.1	16.3	15.0	11.9	9.9	6.2	5.5	22.6	1.5
Spruces	312.4	73.1	85.5	61.3	36.0	29.9	13.9	6.3	6.4	—
Balsam fir	218.6	76.7	60.5	49.5	20.3	9.5	1.5	.6	—	—
Hemlock	135.1	25.8	25.8	28.1	18.0	13.5	11.5	6.5	5.9	—
Other softwoods[1]	55.3	23.4	17.5	9.1	2.9	1.5	.9	—	—	—
Total softwoods	831.4	220.1	205.6	163.0	89.1	64.3	34.0	18.9	34.9	1.5
Red oak	—	—	—	—	—	—	—	—	—	—
White oak	—	—	—	—	—	—	—	—	—	—
Yellow birch	147.1	20.1	19.1	29.4	17.4	22.2	14.5	7.3	14.8	2.3
Paper birch	78.2	21.9	27.2	12.8	9.5	4.6	1.6	.6	—	—
Sugar maple	370.0	65.3	79.8	72.6	47.9	36.1	26.4	14.8	24.9	2.2
Soft maple	105.9	16.7	23.9	30.6	13.1	9.5	6.0	3.6	2.5	—
Beech	93.6	7.5	18.6	12.0	14.5	18.8	11.4	5.4	5.4	—
Ash	46.5	7.8	10.9	12.7	7.7	2.5	3.4	.4	.7	.4
Aspen	38.0	10.4	8.6	7.7	4.0	6.4	.9	—	—	—
Other hardwoods	46.1	5.9	8.5	9.2	7.6	4.5	2.7	2.3	5.4	—
Total hardwoods	925.4	155.6	196.6	187.0	121.7	104.6	66.9	34.4	53.7	4.9
All species	1,756.8	375.7	402.2	350.0	210.8	168.9	100.9	53.3	88.6	6.4

[1] Mostly northern white cedar.

Table 46. — *Volume of growing stock on commercial forest land in the Southern geographic unit, in Vermont, by species and diameter classes, 1966*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White and red pines	180.8	38.4	37.4	25.4	20.6	23.9	12.3	7.9	14.7	0.2
Spruces[1]	171.4	45.3	30.8	32.5	25.3	17.3	9.3	4.9	6.0	—
Balsam fir	—	—	—	—	—	—	—	—	—	—
Hemlock	171.7	41.2	32.5	34.8	22.7	16.5	11.5	8.0	4.5	—
Other softwoods	—	—	—	—	—	—	—	—	—	—
Total softwoods	523.9	124.9	100.7	92.7	68.6	57.7	33.1	20.8	25.2	.2
Red oak	72.4	9.4	8.8	8.9	12.6	13.2	7.7	6.8	5.0	—
White oak	15.8	.4	1.0	2.6	4.1	2.6	1.0	2.1	2.0	—
Yellow birch	106.9	23.1	20.3	18.9	18.9	8.6	6.3	4.6	5.3	.9
Paper birch	131.3	31.6	25.2	33.4	17.0	8.5	7.0	3.8	4.3	.5
Sugar maple	366.5	69.1	77.8	74.8	48.4	35.7	18.7	17.7	22.2	2.1
Soft maples	152.4	26.6	32.2	34.8	24.4	17.7	8.0	4.5	4.2	—
Beech	107.8	18.3	17.9	12.5	17.4	15.0	8.8	7.8	10.1	—
Ash	88.1	13.4	16.7	18.8	14.3	11.8	3.3	4.6	4.7	.5
Aspen	47.2	6.8	13.5	13.5	5.6	3.4	2.6	.7	1.1	—
Other hardwoods	110.7	19.9	28.0	25.3	14.4	8.4	4.4	3.5	5.2	1.6
Total hardwoods	1,199.1	218.6	241.4	243.5	177.1	124.9	67.8	56.1	64.1	5.6
All species	1,723.0	343.5	342.1	336.2	245.7	182.6	100.9	76.9	89.3	5.8

[1] Includes 18.5 million cubic feet of balsam fir and a negligible amount of other softwoods.

Table 47. — *Volume of growing stock on commercial forest land in the National forest geographic unit, in Vermont, by species and diameter classes, 1966*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White and red pines	—	—	—	—	—	—	—	—	—	—
Spruces[1]	21.3	5.4	4.2	4.0	2.3	2.6	1.4	0.2	1.2	—
Balsam fir	—	—	—	—	—	—	—	—	—	—
Hemlock	—	—	—	—	—	—	—	—	—	—
Other softwoods	18.1	5.9	6.3	1.7	1.5	.8	.8	.4	.7	—
Total softwoods	39.4	11.3	10.5	5.7	3.8	3.4	2.2	.6	1.9	—
Red oak	—	—	—	—	—	—	—	—	—	—
White oak	—	—	—	—	—	—	—	—	—	—
Yellow birch	32.6	4.8	4.8	4.9	4.7	2.6	4.7	2.8	3.3	—
Paper birch	11.2	2.5	2.9	2.4	1.8	.6	.3	.5	.2	—
Sugar maple	67.7	4.6	8.5	12.9	12.3	12.6	8.2	2.9	5.4	.3
Soft maples	12.7	1.7	2.2	2.4	3.3	1.0	.6	.3	1.0	.2
Beech	18.4	2.5	2.1	2.3	3.1	3.6	2.6	1.1	1.1	—
Ash	8.8	.5	.2	.7	1.7	3.1	1.4	.7	.5	—
Aspen	—	—	—	—	—	—	—	—	—	—
Other hardwoods	7.7	.3	1.7	1.9	1.1	1.3	.7	.2	.5	—
Total hardwoods	159.1	16.9	22.4	27.5	28.0	24.8	18.5	8.5	12.0	.5
All species	198.5	28.2	32.9	33.2	31.8	28.2	20.7	9.1	13.9	.5

[1] Includes a negligible amount of balsam fir.

Table 48. — *Volume of growing stock on commercial forest land in the State forests geographic unit, in Vermont, by species and diameter classes, 1966*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White and red pines	—	—	—	—	—	—	—	—	—	—
Spruces[1]	11.1	1.9	2.1	2.1	2.1	1.5	0.8	0.3	0.3	—
Balsam fir	—	—	—	—	—	—	—	—	—	—
Hemlock	—	—	—	—	—	—	—	—	—	—
Other softwoods	13.9	3.5	3.7	1.9	1.5	1.2	.8	.5	.7	.1
Total softwoods	25.0	5.4	5.8	4.0	3.6	2.7	1.6	.8	1.0	.1
Red oak	—	—	—	—	—	—	—	—	—	—
White oak	—	—	—	—	—	—	—	—	—	—
Yellow birch	12.6	1.2	2.3	2.1	2.1	1.5	1.1	.8	1.3	.2
Paper birch	6.6	1.5	1.6	1.9	.9	.4	.2	.1	—	—
Sugar maple	24.6	4.6	5.2	4.4	3.2	2.3	2.2	.9	1.8	—
Soft maples	4.9	.5	1.1	.9	1.1	.7	.3	.2	.1	—
Beech	6.6	.9	.7	1.1	1.3	1.0	.8	.5	.3	—
Ash	3.2	.4	.3	.9	.7	.2	.2	.3	.2	—
Aspen	—	—	—	—	—	—	—	—	—	—
Other hardwoods	3.4	.2	.8	.9	.4	.6	.2	.2	.1	—
Total hardwoods	61.9	9.3	12.0	12.2	9.7	6.7	5.0	3.0	3.8	.2
All species	86.9	14.7	17.8	16.2	13.3	9.4	6.6	3.8	4.8	.3

[1] Includes a negligible amount of balsam fir.

Table 49. — *Sampling errors for growing stock on commercial forest land, in Vermont, by species and geographic units, 1966*

Species	Northern	Southern	National forest	State forests	Total
White and red pines	27	16	—	—	14
Spruces	11	16	20	19	9
Balsam fir	12	—	—	—	11
Hemlock	17	14	—	—	11
Other softwoods	27	—	29	21	25
Total softwoods	7	8	20	15	5
Red oak	—	21	—	—	20
White oak	—	44	—	—	57
Yellow birch	12	15	17	9	8
Paper birch	18	14	29	15	10
Sugar maple	11	9	12	9	6
Soft maples	14	13	19	17	9
Beech	15	13	18	14	9
Ash	22	21	30	24	12
Aspen	22	26	—	—	17
Other softwoods	18	11	36	20	15
Total hardwoods	6	4	6	5	3
All species	3	3	3	4	2

Table 50. — *Volume of sawtimber on commercial forest land in the Northern geographic unit, in Vermont, by species and diameter classes, 1966*

(In millions of board feet) [1]

Species	Diameter class (inches at breast height)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White and red pines	268.3	42.2	41.4	37.6	24.3	22.6	96.6	3.6
Spruces	542.8	177.3	129.0	120.0	59.9	28.5	28.1	—
Balsam fir	263.8	144.5	72.9	37.2	6.3	2.9	—	—
Hemlock	289.4	80.4	62.7	50.5	45.4	27.3	23.1	—
Other softwoods	44.5	25.4	10.2	5.5	3.4	—	—	—
Total softwoods	1,408.8	469.8	316.2	250.8	139.3	81.3	147.8	3.6
Red oak	—	—	—	—	—	—	—	—
White oak	—	—	—	—	—	—	—	—
Yellow birch	308.8	—	55.2	83.6	62.1	31.7	66.4	9.8
Paper birch	57.2	—	30.0	18.0	6.7	2.5	—	—
Sugar maple	589.4	—	152.3	135.0	112.1	65.6	115.2	9.2
Soft maples	130.9	—	41.8	36.2	25.5	16.0	11.4	—
Beech	213.0	—	45.7	70.5	48.0	24.5	24.3	—
Ash	53.9	—	24.3	8.9	14.3	2.0	2.8	1.6
Aspen	41.1	—	12.6	24.6	3.9	—	—	—
Other hardwoods	86.5	—	23.7	16.2	11.0	10.3	25.3	—
Total hardwoods	1,480.8	—	385.6	393.0	283.6	152.6	245.4	20.6
All species	2,889.6	469.8	701.8	643.8	422.9	233.9	393.2	24.2

[1] International ¼-inch rule.

Table 51. — *Volume of sawtimber on commercial forest land in the Southern geographic unit, in Vermont, by species and diameter classes, 1966*

(In millions of board feet) [1]

Species	Diameter class (inches at breast height)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White and red pines	379.5	77.1	75.5	91.8	47.9	30.8	55.9	0.5
Spruces[2]	358.7	98.2	94.9	71.1	41.2	22.9	30.4	—
Balsam fir	—	—	—	—	—	—	—	—
Hemlock	349.5	105.2	81.4	64.7	44.8	34.1	19.3	—
Other softwoods	—	—	—	—	—	—	—	—
Total softwoods	1,087.7	280.5	251.8	227.6	133.9	87.8	105.6	.5
Red oak	183.6	—	41.3	52.2	33.8	31.6	24.7	—
White oak	48.3	—	13.7	10.7	4.2	9.2	10.5	—
Yellow birch	175.7	—	62.9	33.7	28.2	21.3	26.1	3.5
Paper birch	160.2	—	56.0	32.5	30.9	17.9	20.7	2.2
Sugar Maple	587.0	—	162.1	139.8	83.0	83.2	107.7	11.2
Soft maples	226.6	—	81.5	68.8	35.2	21.0	20.1	—
Beech	240.3	—	58.4	59.1	39.3	36.2	47.3	—
Ash	153.4	—	46.9	45.9	14.3	20.9	23.1	2.3
Aspen	52.2	—	18.8	13.1	11.7	3.3	5.3	—
Other hardwoods	146.9	—	47.7	32.7	19.5	16.2	23.8	7.0
Total hardwoods	1,974.2	—	589.3	488.5	300.1	260.8	309.3	26.2
All species	3,061.9	280.5	841.1	716.1	434.0	348.6	414.9	26.7

[1] International ¼-inch rule.
[2] Includes 20.1 million board feet of balsam fir and a negligible amount of other softwoods.

Table 52. — *Volume of sawtimber on commercial forest land in the National forest geographic units, in Vermont, by species and diameter classes, 1966*

(In millions of board feet) [1]

Species	Diameter class (inches at breast height)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White and red pines	—	—	—	—	—	—	—	—
Spruces[2]	46.7	12.5	9.0	11.5	7.0	1.4	5.3	—
Balsam fir	—	—	—	—	—	—	—	—
Hemlock	—	—	—	—	—	—	—	—
Other softwoods	25.0	5.6	5.7	3.5	4.0	2.2	4.0	—
Total softwoods	71.7	18.1	14.7	15.0	11.0	3.6	9.3	—
Red oak	—	—	—	—	—	—	—	—
White oak	—	—	—	—	—	—	—	—
Yellow birch	80.9	—	16.9	10.7	22.7	14.0	16.6	—
Paper birch	14.0	—	6.4	2.7	1.3	2.6	1.0	—
Sugar maple	182.0	—	44.4	54.3	39.2	14.7	27.2	2.2
Soft maples	27.0	—	11.8	4.3	2.7	1.8	5.6	.8
Beech	49.8	—	11.4	15.3	12.2	5.3	5.6	—
Ash	32.3	—	6.0	13.1	7.1	3.3	2.8	—
Aspen	—	—	—	—	—	—	—	—
Other hardwoods	16.7	—	4.0	5.5	3.3	1.4	2.5	—
Total hardwoods	402.7	—	100.9	105.9	88.5	43.1	61.3	3.0
All species	474.4	18.1	115.6	120.9	99.5	46.7	70.6	3.0

[1] International ¼-inch rule.
[2] Includes a negligible amount of balsam fir.

Table 53. — *Volume of sawtimber on commercial forest land in the State forests geographic unit, in Vermont, by species and diameter classes, 1966*

(In millions of board feet) [1]

Species	Diameter class (inches at breast height)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White and red pines	—	—	—	—	—	—	—	—
Spruces[2]	32.0	7.3	9.7	7.4	4.2	1.9	1.5	—
Balsam fir	—	—	—	—	—	—	—	—
Hemlock	—	—	—	—	—	—	—	—
Other softwoods	26.4	5.7	6.0	5.4	3.6	2.0	3.4	0.3
Total softwoods	58.4	13.0	15.7	12.8	7.8	3.9	4.9	.3
Red oak	—	—	—	—	—	—	—	—
White oak	—	—	—	—	—	—	—	—
Yellow birch	31.8	—	8.3	7.1	5.1	4.6	6.4	.3
Paper birch	7.1	—	3.9	1.8	1.0	.2	.2	—
Sugar maple	41.1	—	10.1	9.0	9.5	4.3	8.2	—
Soft maples	8.2	—	3.3	2.3	1.3	.9	.4	—
Beech	15.7	—	4.8	4.4	3.3	2.0	1.2	—
Ash	6.6	—	2.3	1.1	.8	1.3	1.1	—
Aspen	—	—	—	—	—	—	—	—
Other hardwoods	5.5	—	1.2	1.9	1.1	.7	.6	—
Total hardwoods	116.0	—	33.9	27.6	22.1	14.0	18.1	.3
All species	174.4	13.0	49.6	40.4	29.9	17.9	23.0	.6

[1] International ¼-inch rule.
[2] Includes a negligible amount of balsam fir.

Table 54. — *Sampling errors for sawtimber on commercial forest land, in Vermont, by species and geographic unit, 1966*

(In percent)

Species	Northern	Southern	National forest	State forests	Total
White and red pines	30	18	—	—	16
Spruces	16	24	29	18	13
Balsam fir	18	—	—	—	17
Hemlock	20	17	—	—	12
Other softwoods	33	—	43	19	31
Total softwoods	8	10	25	14	6
Red oak	—	28	—	—	26
White oak	—	50	—	—	69
Yellow birch	16	18	21	10	10
Paper birch	24	25	32	20	17
Sugar maple	13	11	12	12	7
Soft maples	18	16	23	22	11
Beech	17	16	18	17	10
Ash	31	37	29	25	20
Aspen	32	35	—	—	23
Other hardwoods	22	19	39	20	20
Total hardwoods	8	6	6	7	4
All species	3	3	4	6	2

Table 55. — *Volume of sawtimber on commercial forest land in the Northern geographic unit, in Vermont, by species and quality classes, 1966*

(In millions of board feet) [1]

Species	Standard-lumber logs				Other[2]
	All classes	Grade 1	Grade 2	Grade 3	
Softwoods:					
White and red pines	268.3	11.1	63.5	127.3	66.4
Other softwoods[3]	1,140.5	—	—	—	—
Total	1,408.8	11.1	63.5	127.3	66.4
Hardwoods:					
Red oak	—	—	—	—	—
White oak	—	—	—	—	—
Yellow birch	308.8	57.5	114.7	120.8	15.8
Paper birch	57.2	4.8	24.3	24.0	4.1
Sugar maple	589.4	116.3	175.9	235.5	61.7
Soft maples	130.9	8.6	37.7	64.3	20.3
Beech	213.0	10.5	65.9	114.9	21.7
Ash	53.9	15.0	15.6	16.2	7.1
Other hardwoods	127.6	20.5	32.1	58.4	16.6
Total	1,480.8	233.2	466.2	634.1	147.3
All species	2,889.6	244.3	529.7	761.4	—

[1] International ¼-inch rule.
[2] For white and red pines "Other" is Grade 4, for hardwoods "Other" is Tie-and-Timber Log Grade. For a discussion of log grades see the appendix.
[3] Other softwoods were not graded.

Table 56. — *Volume of sawtimber on commercial forest land in the Southern geographic unit, in Vermont, by species and quality classes, 1966*

(In millions of board feet) [1]

Species	Standard-lumber logs				Other[2]
	All classes	Grade 1	Grade 2	Grade 3	
Softwoods:					
White and red pines	379.3	5.9	28.1	206.5	139.0
Other softwoods[3]	708.2	—	—	—	—
Total	1,087.7	5.9	28.1	206.5	139.0
Hardwoods:					
Red oak	183.6	31.9	55.7	76.2	19.8
White oak	48.3	12.2	12.6	17.5	6.0
Yellow birch	175.7	14.1	51.0	100.1	10.5
Paper birch	160.2	14.6	40.5	84.7	20.9
Sugar maple	587.0	67.6	162.8	292.4	64.2
Soft maples	226.6	9.5	70.0	107.4	39.7
Beech	240.3	6.7	51.3	159.7	22.6
Ash	153.4	32.2	45.7	49.1	26.4
Other hardwoods	199.1	14.7	39.3	112.9	32.2
Total	1,974.2	203.5	528.9	999.5	242.3
All species	3,061.9	209.4	557.0	1,206.0	—

[1] International ¼-inch rule.
[2] For white and red pines "Other" is Grade 4, for hardwoods "Other" is Tie-and-Timber Log Grade. For a discussion of log grades see the appendix.
[3] Other softwoods were not graded.

Table 57. — *Volume of sawtimber on commercial forest land in the National forest geographic unit, in Vermont, by species and quality classes, 1966*

(In millions of board feet) [1]

Species	Standard-lumber logs				Other[2]
	All classes	Grade 1	Grade 2	Grade 3	
Softwoods:					
White and red pines	—	—	—	—	—
Other softwoods[3]	71.7	—	—	—	—
Total	71.7	—	—	—	—
Hardwoods:					
Red oak	—	—	—	—	—
White oak	—	—	—	—	—
Yellow birch	80.9	11.9	24.3	40.6	4.1
Paper birch	14.0	.6	1.7	10.3	1.4
Sugar maple	182.0	16.4	45.4	100.5	19.7
Soft maples	27.0	.7	5.8	17.4	3.1
Beech	49.8	.4	6.8	38.3	4.3
Ash	32.3	10.1	8.9	10.2	3.1
Other hardwoods	16.7	1.0	2.8	11.1	1.8
Total	402.7	41.1	95.7	228.4	37.5
All species	474.4	41.1	95.7	228.4	—

[1] International ¼-inch rule.
[2] For white and red pines "Other" is Grade 4, for hardwoods "Other" is Tie-and-Timber Log Grade. For a discussion of log grades see the appendix.
[3] Other softwoods were not graded.

Table 58. — *Volume of sawtimber on commercial forest land in the State forest geographic unit, in Vermont, by species and quality classes, 1966*

(In millions of board feet) [1]

Species	Standard-lumber logs				Other[2]
	All classes	Grade 1	Grade 2	Grade 3	
Softwoods:					
White and red pines	6.0	0.2	0.6	3.4	1.8
Other softwoods[3]	52.4	—	—	—	—
Total	58.4	.2	.6	3.4	1.8
Hardwoods:					
Red oak	—	—	—	—	—
White oak	—	—	—	—	—
Yellow birch	31.8	5.7	10.9	13.5	1.7
Paper birch	7.1	.5	3.7	2.4	.5
Sugar maple	41.1	5.7	11.2	18.9	5.3
Soft maples	8.2	.4	2.1	4.2	1.5
Beech	15.7	1.1	4.2	9.0	1.4
Ash	6.6	1.7	2.1	1.8	1.0
Other hardwoods	5.5	.7	1.3	2.8	.7
Total	116.0	15.8	35.5	52.6	12.1
All species	174.4	16.0	36.1	56.0	—

[1] International ¼-inch rule.
[2] For white and red pines "Other" is Grade 4, for hardwoods "Other" is Tie-and-Timber Log Grade. For a discussion of log grades see the appendix.
[3] Other softwoods were not graded.

Table 59. — *Average net annual growth of growing stock on commercial forest land in Vermont, by species and geographic unit, 1948-1965*

(In thousands of cubic feet)

Species	Northern	Southern	National forest	State forests	Total
White pine	2,321	9,963	—	—	12,284
Spruce and fir	12,064	5,285	296	361	18,006
Other softwoods	6,343	1,975	252	440	9,010
Total softwoods	20,728	17,223	548	801	39,300
Oaks	—	2,554	—	—	2,554
Yellow birch	1,995	502	205	79	2,781
Sugar maple	12,533	4,023	1,215	432	18,203
Soft maples	2,319	1,478	166	62	4,025
Ash	1,004	980	88	32	2,104
Other hardwoods	7,625	5,603	563	242	14,033
Total hardwoods	25,476	15,140	2,237	847	43,700
All species	46,204	32,363	2,785	1,648	83,000
		Sampling errors, in percent			
All species	37	34	26	**	25

** More than 100 percent.

Table 60. — *Average annual cut of growing stock on commercial forest land in Vermont, by species and geographic unit, 1948-1965*

(In thousands of cubic feet)

Species	Northern	Southern	National forest	State forests	Total
White pine	1,176	4,854	—	—	6,030
Spruce and fir	6,571	3,201	320	115	10,207
Hemlock and other softwoods	5,413	4,518	270	62	10,263
Total softwoods	13,160	12,573	590	177	26,500
Oaks	—	1,712	—	—	1,712
Yellow birch	3,242	5,314	361	98	9,015
Sugar maple	4,398	4,845	399	130	9,772
Soft maples	449	1,949	219	16	2,633
Beech	1,624	4,278	108	64	6,074
Ash	397	639	132	20	1,188
Other hardwoods	2,117	1,267	856	66	4,306
Total hardwoods	12,227	20,004	2,075	394	34,700
All species	25,387	32,577	2,665	571	61,200
		Sampling errors in percent			
All species	30	30	*	*	30

* Based upon cutting reports; no sampling errors.

Table 61. — *Average net annual growth of saw timber on commercial forest land in Vermont, by species and geographic unit, 1948-1965*

(In thousands of board feet)

Species	Northern	Southern	National forest	State forests	Total
White pine	10,625	23,579	—	—	34,204
Spruce and fir	24,116	10,570	677	637	36,000
Other softwoods	10,902	8,854	512	1,128	21,396
Total softwoods	45,643	43,003	1,189	1,765	91,600
Oaks	—	7,700	—	—	7,700
Yellow birch	4,500	1,129	461	178	6,268
Sugar maple	24,578	10,803	2,600	924	38,905
Soft maples	4,934	4,523	413	154	10,024
Ash	2,070	3,726	413	96	6,305
Other hardwoods	7,554	5,547	557	240	13,898
Total hardwoods	43,636	33,428	4,444	1,592	83,100
All species	89,279	76,431	5,633	3,357	174,700
		Sampling errors in percent			
All species	50	*	36	**	24

* 51 to 100 percent.
** More than 100 percent.

Table 62. — *Average annual cut of sawtimber on commercial forest land in Vermont, by species and geographic units, 1948-1965*

(In thousands of board feet)

Species	Northern	Southern	National forest	State forests	Total
White and red pine	6,035	27,055	—	—	33,090
Spruce and balsam fir	36,413	7,012	1,037	304	44,766
Hemlock and other softwoods	18,252	31,832	998	198	51,280
Total softwoods	60,700	65,899	2,035	502	129,136
Oaks	—	4,818	—	—	4,818
Yellow birch	11,113	19,662	1,383	307	32,465
Sugar maple	9,216	16,000	1,187	314	26,717
Soft maples	—	1,650	672	40	2,362
Beech	5,317	13,863	392	188	19,760
Ash	2,248	898	396	50	3,592
Other hardwoods	2,356	2,913	1,600	99	6,968
Total hardwoods	30,250	59,804	5,630	998	96,682
All species	90,950	125,703	7,665	1,500	225,818
		Sampling errors, in percent			
All softwoods	31.2	39.4	*	*	25.4
All hardwoods	36.5	30.4	*	*	23.6
All species	23.9	23.5	*	*	16.9

* Based upon cutting report, no sampling errors.

Table 63. — *Area of Vermont, by land classes and counties, 1966*

County	Total area	Total land area[1]	Nonforest land area	Forest land area			
				Noncommercial[2]	Commercial		Sampling error[3]
	M acres	*M acres*	*M acres*	*M acres*	*M acres*	*Percent*	*Percent*
Addison	523.5	502.4	231.1	5.2	266.1	53	3
Bennington	430.7	430.1	61.1	3.6	365.4	85	2
Caledonia	396.2	392.3	112.9	1.3	278.1	71	3
Chittenden	393.0	340.5	143.2	.7	196.6	58	4
Essex	429.4	424.3	31.2	1.5	391.6	92	1
Franklin	450.6	421.7	207.9	1.8	212.0	50	6
Grand Isle	121.0	49.3	49.3	—	—	—	—
Lamoille	304.6	304.0	53.9	1.8	248.3	82	2
Orange	442.9	441.6	119.2	.6	321.8	73	3
Orleans	471.7	457.6	134.2	.8	322.6	70	3
Rutland	600.9	594.6	156.5	4.8	433.3	73	2
Washington	457.0	453.1	97.5	3.4	352.2	78	2
Windham	509.4	507.5	81.9	.2	425.4	84	2
Windsor	618.9	617.6	135.0	1.4	481.2	78	2
All counties	6,149.8	5,936.6	1,614.9	27.1	4,294.6	72	1

[1] Land area from 1964 Census of Agriculture, Volume 1. Total area less water areas of 40 acres or larger.
[2] Includes nonproductive and productive-reserved forest land.
[3] In percent for commercial forest land, at the 68-percent probability level.

Table 64. — *Area of commercial forest land in Vermont, by ownership classes and counties, 1966*

(In thousands of acres)

County	Public[1]			Private		Total
	National forest	State forests	Other public	Farmer-owned[2]	Other private	
Addison	75.6	0.7	5.4	77.4	107.0	266.1
Bennington	58.2	1.4	9.6	49.4	246.8	365.4
Caledonia	—	14.1	2.1	140.8	121.1	278.1
Chittenden	—	8.3	5.5	79.2	103.6	196.6
Essex	—	5.0	.8	48.9	336.9	391.6
Franklin	—	—	1.1	128.9	82.0	212.0
Lamoille	—	6.5	7.4	68.9	165.5	248.3
Orange	—	1.7	5.8	139.7	174.6	321.8
Orleans	—	2.1	8.5	169.7	142.3	322.6
Rutland	48.9	8.2	12.4	145.4	218.4	433.3
Washington	3.3	21.8	6.5	87.5	233.1	352.2
Windham	14.4	1.5	6.3	76.8	326.4	425.4
Windsor	19.5	12.0	24.3	139.0	286.4	481.2
Total	219.9	83.3	95.7	1,351.6	2,544.1	4,294.6

[1] From ownership records.

[2] Ratios for farmer-owned forest land by county were derived for each geographic unit from the 1964 Census of Agriculture.

Table 65. — *Area of commercial forest land in Vermont, by stand-size classes and counties, 1966*

(In thousands of acres)

County	Sawtimber stands	Poletimber stands	Sapling-and-seedling stands	Nonstocked areas	Total
Addison	118.3	94.0	53.8	—	266.1
Bennington	160.8	140.8	63.8	—	365.4
Caledonia	100.9	83.7	87.1	6.4	278.1
Chittenden	74.1	71.4	51.1	—	196.6
Essex	175.8	137.3	75.5	3.0	391.6
Franklin	59.5	51.5	91.3	9.7	212.0
Lamoille	108.1	84.9	52.3	3.0	248.3
Orange	125.6	100.6	89.5	6.1	321.8
Orleans	129.0	103.4	84.5	5.7	322.6
Rutland	183.4	161.4	88.5	—	433.3
Washington	149.8	117.7	79.9	4.8	352.2
Windham	177.7	167.8	79.9	—	425.4
Windsor	204.8	185.3	91.1	—	481.2
Total	1,767.8	1,499.8	988.3	38.7	4,294.6

Table 66. — *Area of commercial forest land in Vermont, by stocking percent classes of desirable trees and counties, 1966*

(In thousands of acres)

County	Desirable-tree stocking class			Total
	70 to 100 percent	40 to 70 percent	Under 40 percent	
Addison	0.4	9.9	255.8	266.1
Bennington	.6	12.8	352.0	365.4
Caledonia	8.0	50.2	219.9	278.1
Chittenden	.4	11.3	184.9	196.6
Essex	14.6	66.2	310.8	391.6
Franklin	4.3	40.5	167.2	212.0
Lamoille	9.1	42.8	196.4	248.3
Orange	9.5	55.7	256.6	321.8
Orleans	10.2	56.3	256.1	322.6
Rutland	.7	20.8	411.8	433.3
Washington	11.7	59.3	281.2	352.2
Windham	1.2	17.8	406.4	425.4
Windsor	1.8	22.0	457.4	481.2
Total	72.5	465.6	3,756.5	4,294.6

Table 67. — *Area of commercial forest land in Vermont, by forest-type groups and counties, 1966*

(In thousands of acres)

County	Forest-type group							Total
	White-red pine	Spruce-fir	Oak-pine	Oak-hickory	Elm-ash-red maple	Maple-beech-birch	Aspen-birch	
Addison	33.6	21.3	5.4	7.5	33.6	147.9	16.8	266.1
Bennington	50.2	26.5	6.9	11.3	50.9	198.2	21.4	365.4
Caledonia	37.8	77.9	.9	1.7	33.3	109.7	16.8	278.1
Chittenden	34.3	16.8	6.4	5.4	34.5	83.3	15.9	196.6
Essex	45.4	103.2	1.9	1.3	31.9	189.9	18.0	391.6
Franklin	34.5	63.1	.4	1.4	38.6	61.3	12.7	212.0
Lamoille	29.0	65.6	1.2	.7	22.2	117.9	11.7	248.3
Orange	43.2	87.6	1.4	1.6	36.8	135.2	16.0	321.8
Orleans	41.9	88.4	1.3	1.4	34.4	138.7	16.5	322.6
Rutland	63.2	35.5	12.4	12.4	65.3	215.9	28.6	433.3
Washington	40.8	91.1	1.9	1.2	32.9	167.5	16.8	352.2
Windham	68.3	31.8	9.8	13.7	66.8	208.7	26.3	425.4
Windsor	77.6	40.3	12.8	15.4	73.8	230.2	31.1	481.2
Total	599.8	749.1	62.7	75.0	555.0	2,004.4	248.6	4,294.6

Table 68. — *Volume of growing stock on commercial forest, land in Vermont, by stand-size classes and counties, 1966*

County	Sawtimber stands	Poletimber stands	Other stands	Total	Sampling error of total
	Millions of cubic feet				*Percent*
Addison	132.2	84.8	16.0	233.0	5
Bennington	187.1	127.5	21.6	336.2	4
Caledonia	112.4	84.9	22.1	219.4	5
Chittenden	82.7	61.5	14.0	158.2	6
Essex	211.0	142.1	24.6	377.7	4
Franklin	60.3	48.3	18.0	126.6	7
Lamoille	131.1	87.8	15.6	234.5	5
Orange	140.7	98.0	23.3	262.0	5
Orleans	148.3	102.6	22.7	273.6	5
Rutland	212.2	144.8	26.1	383.1	4
Washington	178.1	119.2	23.3	320.6	4
Windham	214.8	149.5	26.4	390.7	4
Windsor	254.2	167.1	28.3	449.6	4
All counties	2,065.1	1,418.1	282.0	3,765.2	2

Table 69. — *Net cubic-foot volume on commercial forest land in Vermont, by tree classes and counties, 1966*

(In millions of cubic feet)

County	Sawtimber trees	Poletimber trees	Total growing stock	Rough and/or rotten trees	Total sound volume
Addison	113.1	119.9	233.0	34.4	267.4
Bennington	159.1	177.1	336.2	46.0	382.2
Caledonia	97.4	122.0	219.4	27.1	246.5
Chittenden	71.6	86.6	158.2	21.1	179.3
Essex	173.8	203.9	377.7	40.6	418.3
Franklin	53.8	72.8	126.6	16.9	143.5
Lamoille	108.3	126.2	234.5	25.1	259.6
Orange	116.7	145.3	262.0	30.7	292.7
Orleans	123.3	150.3	273.6	31.1	304.7
Rutland	181.0	202.1	383.1	51.2	434.3
Washington	146.7	173.9	320.6	36.0	356.6
Windham	181.0	209.7	390.7	49.9	440.6
Windsor	212.2	237.4	449.6	56.9	506.5
Total	1,738.0	2,027.2	3,765.2	467.0	4,232.2

Table 70. — *Volume of sawtimber on commercial forest land in Vermont, by stand-size classes and counties, 1966*

County	Sawtimber stands	Poletimber stands	Other stands	Total	Sampling error of total
	Millions of board feet				*Percent*
Addison	345.9	86.2	21.1	453.2	6
Bennington	472.3	127.2	27.7	627.2	5
Caledonia	261.3	81.0	16.6	358.9	7
Chittenden	202.2	58.0	16.3	276.5	7
Essex	486.6	129.0	21.0	636.6	6
Franklin	136.7	45.9	12.8	195.4	9
Lamoille	304.8	80.3	13.4	398.5	7
Orange	319.1	88.4	18.0	425.5	7
Orleans	338.8	93.3	17.9	450.0	7
Rutland	531.9	144.5	33.1	709.5	6
Washington	414.7	108.9	19.6	543.2	6
Windham	523.7	145.3	31.8	700.8	6
Windsor	627.5	164.0	33.5	825.0	6
All counties	4,965.5	1,352.0	282.8	6,600.3	2

Table 71. — *Volume of growing stock on commercial forest land in Vermont, by species group and counties, 1966*

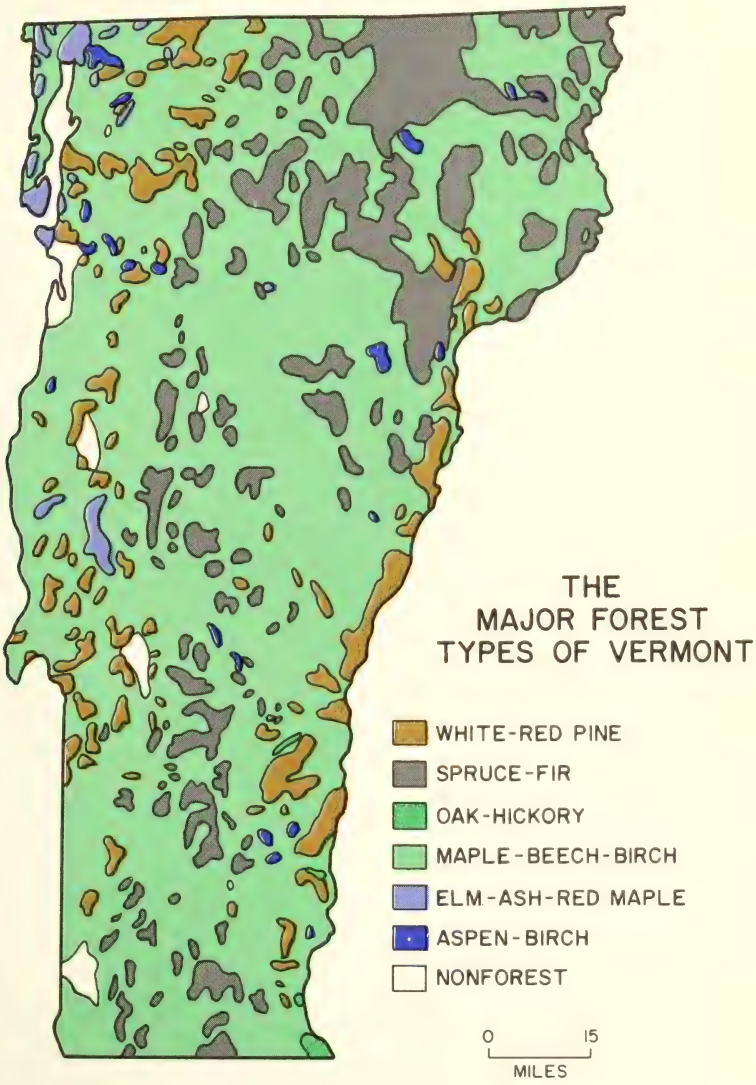
(In millions of cubic feet)

Counties	All species	Softwoods	Hardwoods
Addison	233.0	63.6	169.4
Bennington	336.2	92.8	243.4
Caledonia	219.4	106.7	112.7
Chittenden	158.2	49.7	108.5
Essex	377.7	177.0	200.7
Franklin	126.6	63.0	63.6
Lamoille	234.5	109.4	125.1
Orange	262.0	120.5	141.5
Orleans	273.6	128.3	145.3
Rutland	383.1	109.2	273.9
Washington	320.6	144.2	176.4
Windham	390.7	116.5	274.2
Windsor	449.6	138.8	310.8
Total	3,765.2	1,419.7	2,345.5

Table 72. — *Volume of sawtimber on commercial forest land in Vermont, by species group and counties, 1966*

(In millions of board feet)

Counties	All species	Softwoods	Hardwoods
Addison	453.2	127.4	325.8
Bennington	627.2	190.5	436.7
Caledonia	358.9	178.6	180.3
Chittenden	276.5	100.3	176.2
Essex	636.6	309.8	326.8
Franklin	195.4	98.5	96.9
Lamoille	398.5	193.1	205.4
Orange	425.5	200.2	225.3
Orleans	450.0	217.0	233.0
Rutland	709.5	223.9	485.6
Washington	543.2	252.0	291.2
Windham	700.8	242.8	458.0
Windsor	825.0	292.5	532.5
Total	6,600.3	2,626.5	3,973.7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PULPWOOD PRODUCTION in the Northeast 1967

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by Neal P. Kingsley
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U.S.D.A. FOREST SERVICE RESOURCE BULLETIN NE-13
1969

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

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PULPWOOD PRODUCTION

in the Northeast 1967

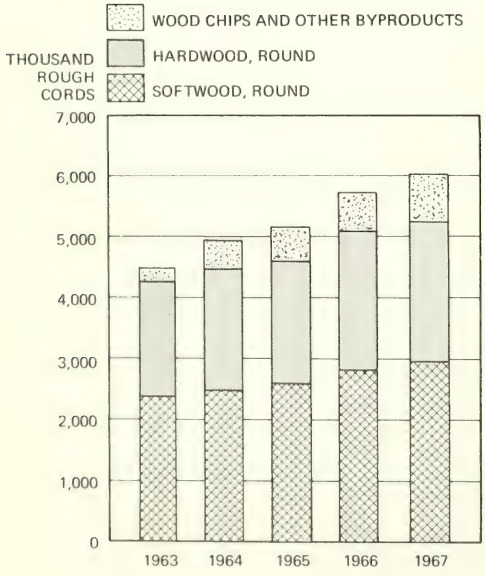

Figure 1. — Total pulpwood production in the 14 states of the Northeast, 1963-67.

Pulpwood Production Tops 6 Million Cords

PULPWOOD production in the Northeast in 1967 increased 5 percent over that in 1966. This modest increase was sufficient to push total production to over 6 million cords. Total production of all forms of pulpwood in the 14 Northeastern States[1] amounted to 6,023,600 cords in 1967. This total represents a gain of 285,900 cords over the 1966 total of 5,737,700 cords (fig. 1).

This 5-percent increase is well below the 12-percent increase experienced between 1965 and 1966. It is also somewhat below the average annual increase of 7.4 percent experienced from 1963 through 1967. Undoubtedly the increase over 1966 was small because the unusually high mill-yard inventories of pulpwood carried over into 1967 and because the rate of expansion in the woodpulp industry generally slackened during 1967.

Receipts of pulpwood at northeastern woodpulp mills totaled 6,296,300 cords of all forms of pulpwood in 1967 (table 2). Thus pulpwood production in the region (6,023,600 cords) equaled 96 percent of pulpwood receipts.

[1] Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia.

Round Pulpwood Up Less Than 3 Percent

The production of round pulpwood gained 153,700 cords—slightly less than 3 percent—over the 1966 production. In 1967 round pulpwood production in the Northeast totaled 5,313,300 cords, compared with 5,159,600 cords in 1966. The 1966-67 gain of 3 percent falls well short of the 12-percent 1965-66 gain. Again, this appears to reflect the slowdown in industry expansion.

Round pulpwood receipts by woodpulp mills in the Northeast totaled 5,572,000 cords in 1967 (table 4). The round pulpwood production—5,313,300 cords—equaled 95 percent of the total round pulpwood received by mills in the Northeast.

Delaware Shows Large Increase In Round Pulpwood Production

Delaware showed the most outstanding gain in round pulpwood production of all 14 states. In 1967 round pulpwood production in Delaware totaled 97,900 cords, up from 44,300 cords in 1966. This 123-percent increase in production doubled Delaware's share of the region's total production. In 1966 Delaware produced 0.9 percent of the region's total, in 1967 it produced 1.8 percent.

With the exception of Delaware, each of the Northeastern States has produced nearly the same proportion of the region's round pulpwood for the last 3 years. Seven states—Connecticut, Maine, Maryland, Massachusetts, New Hampshire, Rhode Island, and Vermont—showed increases of less than 1 percent. Kentucky, New Jersey, and New York showed downward trends of less than 1 percent. The remaining three states—Ohio, Pennsylvania, and West Virginia—fluctuated during the 3 years. But in all cases the net change was less than 1.5 percent. Ohio and Pennsylvania rose from 1965 to 1966 but then fell back near their 1965 production in 1967. West Virginia fell from 1965 to 1966 and rose from 1966 to 1967, but failed to reach its 1965 production.

Twenty Counties Top 50 Thousand Cord Mark

Twenty counties in seven states produced over 50 thousand cords of round pulpwood in 1967. Of these counties 12 produced over 50 thousand cords in 1966, and five others had produced over 50 thousand cords in years before 1966. The new big producers are Sussex County, Del., Centre County, Pa., and Grant County, W. Va. Sussex County's production soared from 41,900 cords in 1966 to 95,700 cords in 1967—a gain of 128 percent. Nearly all of this was pine. Centre County, which is Pennsylvania's largest county, has consistently produced a substantial amount of wood, but 1967 is the first year that the total (56,500 cords) topped 50 thousand cords. Grant County has been producing more and more pulpwood each year since 1963 when it produced 25,800 cords.

These 20 counties produced a total of 3,370,000 cords of round pulpwood, or 63 percent of the region's total round pulpwood production. These 20 top counties and their production are:

County and State	*Thousand cords*
1. Aroostook, Maine	561.7
2. Somerset, Maine	422.4
3. Piscataquis, Maine	398.9
4. Penobscot, Maine	390.5
5. Washington, Maine	249.4
6. Oxford, Maine	210.4
7. Coos, N.H.	191.9
8. Franklin, Maine	142.4
9. Sussex, Del.*	95.7
10. Hancock, Maine	85.8
11. Waldo, Maine	83.4
12. Clearfield, Pa.**	76.1
13. Kennebec, Maine	65.2
14. Hampshire, W. Va.**	61.3
15. Huntingdon, Pa.	60.2
16. Lincoln, Maine**	59.8
17. Centre, Pa.*	56.5
18. Essex, Vt.**	54.6
19. Grant, W. Va.*	52.0
20. Essex, N.Y.**	51.8
	3,370.0

* 1967 is the first year the county produced over 50 thousand cords.

** County did not produce over 50 thousand cords in 1966 but has in other years.

Intensity of the Round Pulpwood Harvest of 1967

Figure 2 shows the total round pulpwood harvest by production class and county in the Northeast. Figure 3 shows the harvest per thousand acres of commercial forest land[2] by production class and county. A comparison of these two figures shows some striking relationships. Several counties that have a high total production have a relatively low harvest per thousand acres of commercial forest land and vice versa. This contrast can be seen by comparing St. Lawrence County, N.Y., and Montgomery County, Ohio. St. Lawrence County produced a total of 38,300 cords. and 35 cords per thousand acres of commercial forest land. The opposite is true of Montgomery County, which produced only 3,300 cords but produced 183 cords per thousand acres.

Wood Chip Production Gains 27 Percent

The production of pulpwood chips in the Northeast rose from 557,700 to 708,400 cords in 1967—a gain of 27 percent. Softwood chip production declined from 202,700 cords in 1966 to 189,100 cords in 1967—a drop of 7 percent. This is the second consecutive year that softwood chip production has declined. However, hardwood chip production showed a substantial gain of 45 percent from 1966. Production of hardwood chips rose from 355,000 cords in 1966 to 519,300 cords in 1967.

Several states made outstanding gains in pulpwood chip production in 1967. The most notable of these was Kentucky, where production rose from 27,400 cords in 1966 to 73,000 cords in 1967. This is a gain of over 166 percent. A new pulpmill that relies entirely on pulpwood chips and does not utilize round pulpwood was the main cause of the large increase in Kentucky wood chip production. This installation is the first of its kind in the Northeast.

[2] Commercial forest land is defined as forest land that is producing or is capable of producing timber crops and that is not withdrawn from timber production by statute or administrative regulation.

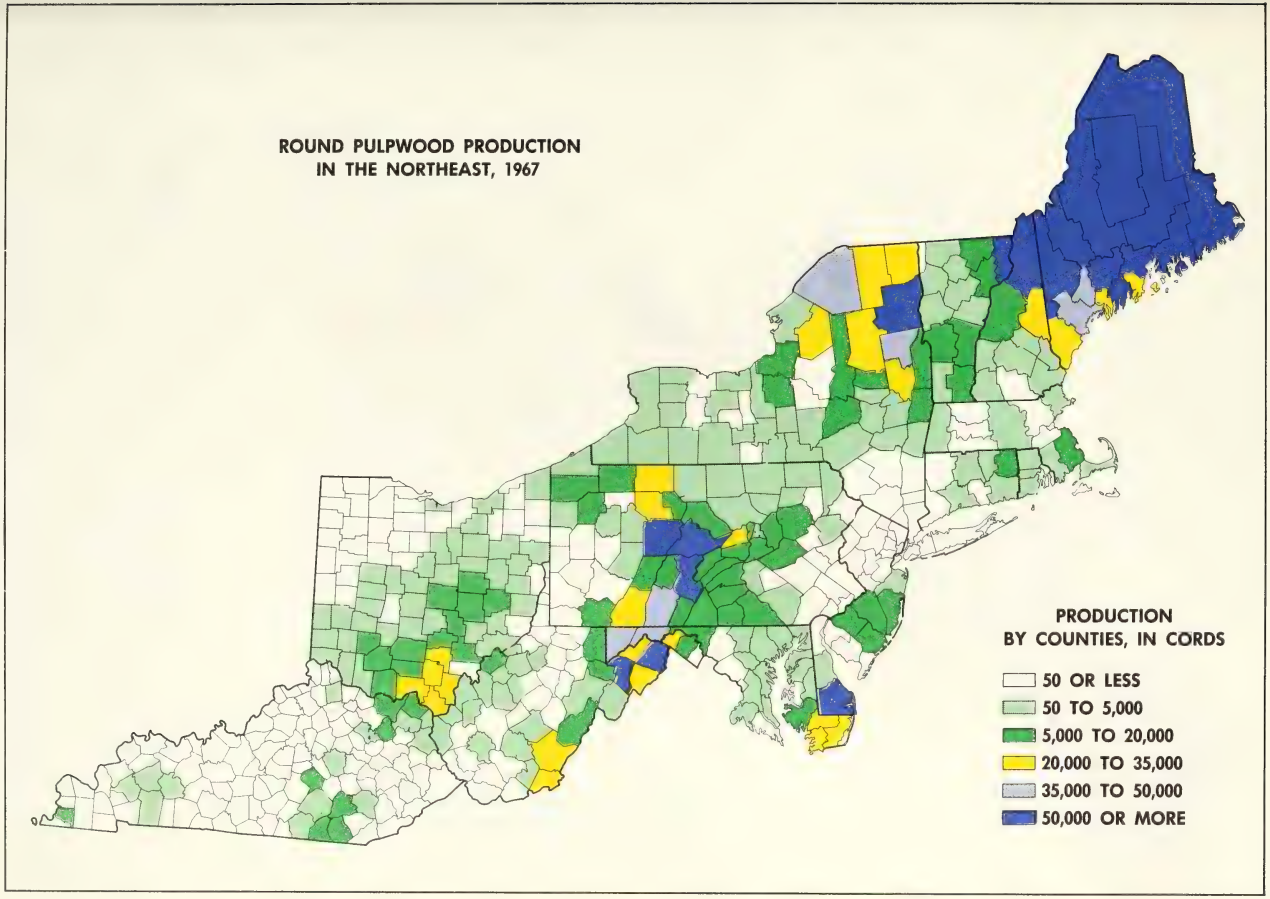

Figure 2. — The geographical pattern of round pulpwood production in the Northeast, 1967.

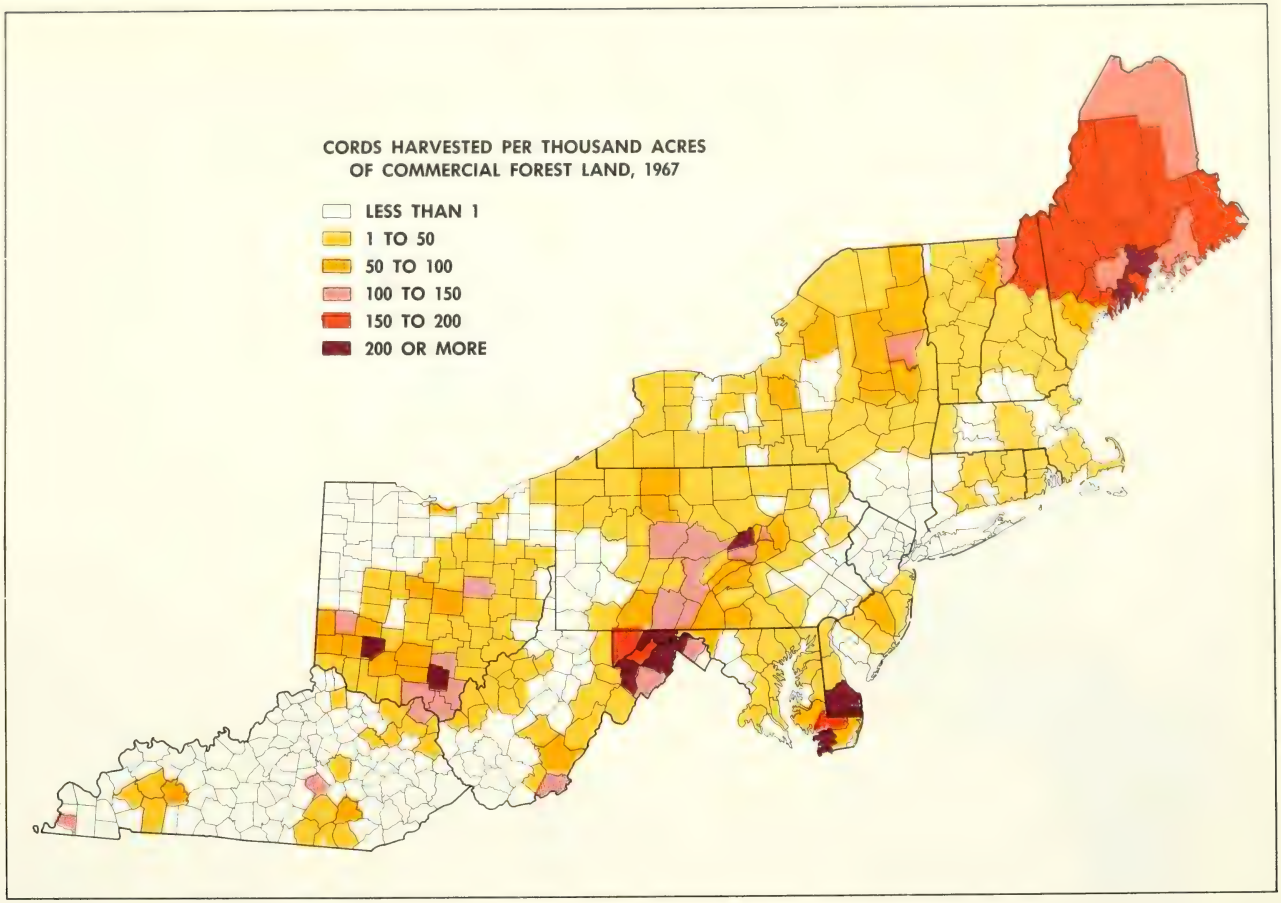

Figure 3. — The intensity of the round pulpwood harvest by counties in the Northeast, 1967.

Pulpwood chip production in West Virginia rose 54 percent—from 76,400 cords in 1966 to 117,400 cords in 1967. Other outstanding gains were made in: Pennsylvania—up 49 percent, Ohio—up 41 percent, New Hampshire—up 34 percent, New York—up 33 percent, and Maryland—up 25 percent.

Use of Other Byproducts Hits All-time Low

The use of other wood-industry byproducts for pulpwood reached a low of 1,900 cords in 1967. This is the smallest volume for any year since these annual canvasses began in 1963.

■

Table 1. — Total production of all forms of pulpwood in the Northeast, by state, 1967

(In thousand rough cords)[1]

State	Total roundwood	Total pulpwood chips	Total all other byproducts	Total all forms
Connecticut	14.1	—	—	14.1
Delaware	97.9	—	—	97.9
Kentucky	86.9	73.0	—	159.9
Maine	2,843.6	103.8	—	2,947.4
Maryland	192.3	58.6	—	250.9
Massachusetts	20.9	5.8	—	26.7
New Hampshire	237.8	82.4	—	320.2
New Jersey	45.1	1.8	0.3	47.2
New York	394.3	68.2	.6	463.1
Ohio	281.1	54.9	—	336.0
Pennsylvania	630.8	124.0	—	754.8
Rhode Island	7.7	—	—	7.7
Vermont	127.5	18.5	1.0	147.0
West Virginia	333.3	117.4	—	450.7
Total	5,313.3	708.4	1.9	6,023.6

[1] 128 cubic feet of wood, bark, and airspace.

Table 2. — Total production and receipts of all forms of pulpwood in the Northeast, by state, and total production as a percent of total receipts, 1967

State	Total production of all forms of pulpwood	Total receipts of all forms of pulpwood	Total production as a percent of total receipts
	Thousand rough cords		*Percent*
Connecticut	14.1	(D)	(D)
Delaware	97.9	—	—
Kentucky	159.9	(D)	(D)
Maine	2,947.4	3,150.7	94
Maryland	250.9	(D)	(D)
Massachusetts	26.7	(D)	(D)
New Hampshire	320.2	436.8	73
New Jersey	47.2	52.6	90
New York	463.1	679.9	68
Ohio	336.0	423.7	79
Pennsylvania	754.8	961.3	79
Rhode Island	7.7	(D)	(D)
Vermont	147.0	(D)	(D)
West Virginia	450.7	—	—
Total	6,023.6	6,296.3	96

(D) Withheld to avoid disclosing data for individual mills.

Table 3. — Round pulpwood production in the Northeast by state and species groups, 1967

(In thousand rough cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and Yellow-poplar	Oak and hickory	Other[1] hardwoods	Total	
Connecticut	—	—	7.0	7.0	—	2.9	4.2	7.1	14.1
Delaware	—	—	93.7	93.7	—	(*)	4.2	4.2	97.9
Kentucky	0.2	1.5	26.2	27.9	4.8	45.1	9.1	59.0	86.9
Maine	1,731.4	299.9	136.4	2,167.7	49.5	37.6	588.8	675.9	2,843.6
Maryland	1.5	.8	95.8	98.1	8.3	44.0	41.9	94.2	192.3
Massachusetts	—	—	13.1	13.1	—	2.2	5.6	7.8	20.9
New Hampshire	94.1	11.3	7.5	112.9	3.1	—	121.8	124.9	237.8
New Jersey	—	—	36.4	36.4	—	7.8	.9	8.7	45.1
New York	74.1	16.2	42.3	132.6	14.0	14.3	233.4	261.7	394.3
Ohio	.7	.8	13.6	15.1	8.4	182.6	75.0	266.0	281.1
Pennsylvania	.1	9.4	75.0	84.5	9.6	278.4	258.3	546.3	630.8
Rhode Island	—	—	4.6	4.6	—	2.3	.8	3.1	7.7
Vermont	87.3	2.7	3.8	93.8	1.7	(*)	32.0	33.7	127.5
West Virginia	12.1	7.2	73.3	92.6	40.3	124.8	75.6	240.7	333.3
Total	2,001.5	349.8	628.7	2.980.0	139.7	742.0	1,451.6	2,333.3	5,313.3

[1] Chiefly maple species, beech, gums, elms, and birch species.

* Less than 50 cords.

Table 4. — Round pulpwood production and receipts in the Northeast by state and destination and source of wood, 1967

(In thousand rough cords)

State	Total production (2+3+4)	Produced within the state			Received from other states or provinces		Total received (4+5+6)
		Shipped to other states in Northeast	Shipped outside the Northeast	Received within the state	In the Northeast	Outside the Northeast	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Connecticut	14.1	(D)	—	(D)	—	—	(D)
Delaware	97.9	38.5	59.4	—	—	—	—
Kentucky	86.9	35.0	51.9	—	—	—	—
Maine	2,843.6	54.6	10.4	2,778.6	18.8	215.5	3,012.9
Maryland	192.3	35.7	65.8	90.8	267.8	74.9	433.5
Massachusetts	20.9	19.3	—	(D)	(D)	—	(D)
New Hampshire	237.8	35.6	—	202.2	108.5	31.4	342.1
New Jersey	45.1	1.8	—	43.3	—	—	43.3
New York	394.3	4.6	—	389.7	73.7	114.3	577.7
Ohio	281.1	16.7	—	264.3	30.7	1.9	296.9
Pennsylvania	630.8	49.5	—	581.3	127.5	87.9	796.7
Rhode Island	7.7	—	—	(D)	(D)	—	(D)
Vermont	127.5	(D)	—	(D)	—	—	(D)
West Virginia	333.3	253.8	79.5	—	—	—	—
Total	5,313.3	668.5	267.0	4,377.6	668.5	525.9	5,572.0

(D) Withheld to avoid disclosing data for individual mills.

Table 5. — Pulpwood chip production in the Northeast, by state and destination and by softwood and hardwood, 1967[1]

(In thousand rough cord equivalents)

State[2]	Total production			Received in state			Received out of state			
	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Receiving state
Kentucky	6.9	66.1	73.0	—	21.2	21.2	0.2	16.3	16.5	Ohio
							5.7	19.2	24.9	Tennessee
							1.0	9.4	10.4	Virginia
Maine	78.5	25.3	103.8	70.3	21.6	91.9	—	.1	.1	Massachusetts
							8.2	3.6	11.8	New Hampshire
Maryland	35.2	23.4	58.6	.1	4.9	5.0	.3	—	.3	New Jersey
							16.8	18.5	35.3	Pennsylvania
							18.0	—	18.0	Virginia
Massachusetts	—	5.8	5.8	—	.2	.2	—	5.6	5.6	New York
New Hampshire	56.2	26.2	82.4	38.6	22.1	60.7	17.6	2.2	19.8	Maine
							—	1.9	1.9	Massachusetts
New Jersey	—	1.8	1.8	—	1.8	1.8	—	—	—	
New York	1.1	67.1	68.2	1.0	57.6	58.6	—	.6	.6	New Jersey
							.1	8.9	9.0	Pennsylvania
Ohio	—	54.9	54.9	—	54.9	54.9	—	—	—	
Pennsylvania	2.9	121.1	124.0	2.9	110.5	113.4	—	7.3	7.3	Maryland
							(*)	3.3	3.3	New York
							—	(*)	(*)	Ohio
Vermont	4.2	14.3	18.5	—	—	—	1.9	—	1.9	Maine
							2.2	4.2	6.4	New Hampshire
							.1	10.1	10.2	New York
West Virginia	4.1	113.3	117.4	—	—	—	2.5	32.2	34.7	Maryland
							—	47.9	47.9	Ohio
							—	1.7	1.7	Pennsylvania
							—	1.1	1.1	Tennessee
							1.6	30.4	32.0	Virginia
Total	189.1	519.3	708.4	112.9	294.8	407.7	76.2	224.5	300.7	

[1] The data presented in this table are for pulpwood chips produced, by state. They do not represent the source of raw material for chipping plants; nor do they include wood chips not used in the manufacture of woodpulp.

[2] States with no production are omitted.

* Less than 50 cords.

Table 6. — Pulpwood chip production and receipts in the Northeast, by state and destination and source of wood, 1967

(In thousand rough cord equivalents)

State	Total production (2+3+4)	Produced within the state			Received from other states or provinces		Total received (4+5+6)
		Shipped to other states in Northeast	Shipped outside the Northeast	Received within the state	In the Northeast	Outside the Northeast	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Connecticut	—	—	—	—	—	—	—
Delaware	—	—	—	—	—	—	—
Kentucky	73.0	16.5	35.3	(D)	—	(D)	(D)
Maine	103.8	11.9	—	91.9	21.7	24.2	137.8
Maryland	58.6	35.6	18.0	(D)	(D)	—	(D)
Massachusetts	5.8	(D)	—	.2	(D)	—	(D)
New Hampshire	82.4	21.7	—	60.7	18.1	15.9	94.7
New Jersey	1.8	—	—	1.8	7.3	—	9.1
New York	68.2	9.6	—	58.6	19.1	22.9	100.6
Ohio	54.9	—	—	54.9	64.4	7.5	126.8
Pennsylvania	124.0	10.6	—	113.4	45.8	5.4	164.6
Rhode Island	—	—	—	—	—	—	—
Vermont	18.5	18.5	—	—	—	—	—
West Virginia	117.4	84.2	33.2	—	—	—	—
Total	708.4	214.2	86.5	407.7	220.3	94.4	722.4

(d) Withheld to avoid disclosing data for individual mills.

Table 7. — Miscellaneous wood-industry byproducts used in woodpulp manufacture by state and destination and by softwood and hardwood, 1967[1]

(In thousand rough cord equivalents)

State[2]	Total production			Received in state			Received out of state			
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Receiving state
New Jersey	0.2	0.1	0.3	0.2	0.1	0.3	—	—	—	—
New York	—	.6	.6	—	.6	.6	—	—	—	—
Vermont	—	1.0	1.0	—	—	—	—	1.0	1.0	New York
Total	0.2	1.7	1.9	0.2	0.7	0.9	—	1.0	1.0	

[1] Miscellaneous wood-industry byproducts includes any wood received by woodpulp mills that is not roundwood or chips. Examples are veneer cores, post and pole trimmings, and unchipped sawmill slabs and edgings.

[2] States with no production are omitted.

Table 8. — Round pulpwood production in Connecticut by counties and species groups, 1967

(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Fairfield	—	—	—	—	—	—	—	—	—
Hartford	—	—	3.2	3.2	—	—	—	—	3.2
Litchfield	—	—	—	—	—	—	—	—	—
Middlesex	—	—	—	—	—	—	—	—	—
New Haven	—	—	.4	.4	—	—	—	—	.4
New London	—	—	.9	.9	—	0.4	2.7	3.1	4.0
Tolland	—	—	.4	.4	—	.2	—	.2	.6
Windham	—	—	2.1	2.1	—	2.3	1.5	3.8	5.9
Total	—	—	7.0	7.0	—	2.9	4.2	7.1	14.1

Table 9. — Round pulpwood production in Delaware by counties and species groups, 1967

(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Kent	—	—	2.2	2.2	—	—	—	—	2.2
Newcastle	—	—	—	—	—	—	—	—	—
Sussex	—	—	91.5	91.5	—	(*)	4.2	4.2	95.7
Total	—	—	93.7	93.7	—	(*)	4.2	4.2	97.9

* Less than 50 cords.

Table 10. — Round pulpwood production in Kentucky by counties and species groups, 1967

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Bath	0.1	0.1	1.5	1.7	—	—	—	—	1.7
Boyd	(*)	(*)	.3	.3	—	—	—	—	.3
Caldwell	—	—	—	—	0.1	—	—	0.1	.1
Carter	(*)	(*)	.6	.6	—	3.0	0.5	3.5	4.1
Christian	—	—	—	—	.1	—	—	.1	.1
Clay	—	—	—	—	—	.1	(*)	.1	.1
Gallatin	—	—	—	—	—	—	(*)	(*)	(*)
Greenup	—	—	—	—	—	16.7	.1	16.8	16.8
Hickman	—	—	—	—	1.9	1.6	1.9	5.4	5.4
Hopkins	—	—	—	—	1.2	2.4	1.2	4.8	4.8
Laurel	—	—	7.4	7.4	—	2.5	.8	3.3	10.7
Lawrence	(*)	(*)	.2	.2	—	—	—	—	.2
Lewis	—	—	—	—	—	6.9	—	6.9	6.9
Lincoln	—	—	.5	.5	.2	4.7	.8	5.7	6.2
McCreary	—	—	5.1	5.1	.4	1.6	1.4	3.4	8.5
Madison	—	—	—	—	—	.2	.1	.3	.3
Muhlenberg	—	—	—	—	.1	1.1	.1	1.3	1.3
Pendleton	—	—	—	—	—	(*)	.1	.1	.1
Pulaski	—	—	.8	.8	—	—	—	—	.8
Rowan	.1	1.4	1.0	2.5	.8	1.4	1.2	3.4	5.9
Wayne	—	—	1.6	1.6	—	—	—	—	1.6
Whitley	—	—	7.2	7.2	—	2.9	.9	3.8	11.0
Total	0.2	1.5	26.2	27.9	4.8	45.1	9.1	59.0	86.9

[1] Counties with no production are omitted.

* Less than 50 cords.

Table 11. — Round pulpwood production in Maine by counties and species groups, 1967

(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Androscoggin	3.5	4.8	18.4	26.7	0.1	1.1	16.9	18.1	44.8
Aroostook	475.3	19.9	—	495.2	37.8	1.7	27.0	66.5	561.7
Cumberland	5.9	4.0	11.6	21.5	.1	1.7	26.2	28.0	49.5
Franklin	69.5	7.1	6.2	82.8	(*)	3.6	56.0	59.6	142.4
Hancock	45.1	13.3	2.4	60.8	.1	1.5	23.4	25.0	85.8
Kennebec	10.7	7.3	17.1	35.1	.2	1.8	28.1	30.1	65.2
Knox	17.2	4.4	3.4	25.0	(*)	.4	5.6	6.0	31.0
Lincoln	21.0	6.4	15.9	43.3	.1	1.0	15.4	16.5	59.8
Oxford	48.1	23.8	18.7	90.6	1.3	7.1	111.4	119.8	210.4
Penobscot	191.2	87.0	2.8	281.0	5.6	6.2	97.7	109.5	390.5
Piscataquis	327.4	13.9	5.6	346.9	3.4	2.9	45.7	52.0	398.9
Sagadahoc	4.1	2.8	11.7	18.6	.1	.5	7.5	8.1	26.7
Somerset	341.6	16.3	7.7	365.6	.1	3.4	53.3	56.8	422.4
Waldo	26.8	13.9	8.9	49.6	.6	2.0	31.2	33.8	83.4
Washington	143.1	74.2	1.0	218.3	—	1.8	29.3	31.1	249.4
York	.9	.8	5.0	6.7	—	.9	14.1	15.0	21.7
Total	1,731.4	299.9	136.4	2,167.7	49.5	37.6	588.8	675.9	2,843.6

* Less than 50 cords.

Table 12. — Round pulpwood production in Maryland by counties and species groups, 1967
(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Allegany	1.0	0.5	3.7	5.2	3.7	17.8	17.3	38.8	44.0
Anne Arundel	—	—	3.3	3.3	—	.3	.2	.5	3.8
Baltimore	—	—	.1	.1	—	.1	(*)	.1	.2
Calvert	—	(*)	1.5	1.5	(*)	(*)	.1	.1	1.6
Caroline	—	—	2.3	2.3	—	.2	(*)	.2	2.5
Carroll	—	—	(*)	(*)	—	.1	.1	.2	.2
Cecil	—	—	.2	.2	—	.2	.2	.4	.6
Charles	—	—	4.5	4.5	—	—	.1	.1	4.6
Dorchester	—	—	8.2	8.2	—	—	.2	.2	8.4
Frederick	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Garrett	.5	.3	1.9	2.7	4.6	20.6	20.5	45.7	48.4
Harford	—	—	—	—	—	.1	(*)	.1	.1
Howard	—	—	(*)	(*)	—	.1	—	.1	.1
Kent	—	—	.1	.1	(*)	(*)	(*)	(*)	.1
Montgomery	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Prince Georges	—	—	1.8	1.8	—	.1	(*)	.1	1.9
Queen Annes	—	—	.3	.3	—	—	—	—	.3
St. Marys	—	—	—	—	—	—	—	—	—
Somerset	—	—	24.2	24.2	—	—	.3	.3	24.5
Talbot	—	—	(*)	(*)	—	—	—	—	(*)
Washington	(*)	(*)	1.1	1.1	(*)	3.5	1.7	5.2	6.3
Wicomico	—	—	18.7	18.7	—	.9	.8	1.7	20.4
Worcester	—	—	23.9	23.9	—	—	.4	.4	24.3
Total	1.5	0.8	95.8	98.1	8.3	44.0	41.9	94.2	192.3

* Less than 50 cords.

Table 13. — Round pulpwood production in Massachusetts by counties and species groups, 1967

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Barnstable	—	—	0.2	0.2	—	—	—	—	0.2
Berkshire	—	—	—	—	—	(*)	1.5	1.5	1.5
Bristol	—	—	3.0	3.0	—	0.6	.6	1.2	4.2
Essex	—	—	—	—	—	—	1.0	1.0	1.0
Franklin	—	—	—	—	—	(*)	(*)	(*)	(*)
Middlesex	—	—	—	—	—	—	(*)	(*)	(*)
Plymouth	—	—	9.7	9.7	—	1.6	1.9	3.5	13.2
Worcester	—	—	.2	.2	—	—	.6	.6	.8
Total	—	—	13.1	13.1	—	2.2	5.6	7.8	20.9

[1] Counties with no production are omitted.

* Less than 50 cords.

Table 14. — Round pulpwood production in New Hampshire by counties and species groups, 1967

(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Belknap	—	—	0.1	0.1	—	—	0.1	0.1	0.2
Carroll	2.3	1.4	.4	4.1	(*)	—	16.6	16.6	20.7
Cheshire	(*)	—	—	(*)	—	—	.1	.1	.1
Coos	83.8	8.2	3.5	95.5	3.0	—	93.4	96.4	191.9
Grafton	6.9	1.5	3.2	11.6	.1	—	3.9	4.0	15.6
Hillsboro	(*)	(*)	—	(*)	—	—	—	—	(*)
Merrimack	.2	.2	.2	.6	—	—	2.6	2.6	3.2
Rockingham	—	—	—	—	—	—	.7	.7	.7
Strafford	—	—	—	—	—	—	3.7	3.7	3.7
Sullivan	.9	(*)	.1	1.0	—	—	.7	.7	1.7
Total	94.1	11.3	7.5	112.9	3.1	—	121.8	124.9	237.8

* Less than 50 cords.

Table 15. — Round pulpwood production in New Jersey by counties and species groups, 1967

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Atlantic	—	—	7.2	7.2	—	—	0.4	0.4	7.6
Burlington	—	—	13.0	13.0	—	3.9	.4	4.3	17.3
Camden	—	—	4.4	4.4	—	1.4	.1	1.5	5.9
Gloucester	—	—	3.4	3.4	—	2.5	—	2.5	5.9
Monmouth	—	—	1.8	1.8	—	—	—	—	1.8
Ocean	—	—	6.6	6.6	—	—	—	—	6.6
Total	—	—	36.4	36.4	—	7.8	0.9	8.7	45.1

[1] Counties with no production are omitted.

Table 16. — Round pulpwood production in New York by counties and species groups, 1967
(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	—	—	—	—	—	0.1	1.1	1.2	1.2
Allegany	—	—	0.5	0.5	—	—	.6	.6	1.1
Broome	—	—	.1	.1	—	—	1.5	1.5	1.6
Cattaraugus	—	—	(*)	(*)	—	—	1.2	1.2	1.2
Cayuga	(*)	—	.3	.3	—	—	—	—	.3
Chautauqua	—	—	.7	.7	—	—	1.1	1.1	1.8
Chemung	—	—	(*)	(*)	—	—	—	—	(*)
Chenango	1.6	(*)	1.8	3.4	(*)	—	1.2	1.2	4.6
Clinton	7.6	(*)	3.9	11.5	2.0	—	15.5	17.5	29.0
Columbia	—	—	—	—	—	.1	.6	.7	.7
Cortland	.3	—	.4	.7	—	—	—	—	.7
Delaware	.6	—	1.3	1.9	—	(*)	2.6	2.6	4.5
Erie	—	—	.2	.2	.8	—	2.1	2.9	3.1
Essex	5.2	0.1	.5	5.8	1.1	(*)	44.9	46.0	51.8
Franklin	17.8	.7	1.5	20.0	2.3	.1	2.9	5.3	25.3
Fulton	1.0	.9	—	1.9	.2	1.1	12.6	13.9	15.8
Genesee	—	—	—	—	.3	—	.9	1.2	1.2
Greene	—	—	—	—	—	.1	.4	.5	.5
Hamilton	10.0	.1	—	10.1	.3	.6	18.7	19.6	29.7
Herkimer	4.3	.9	.3	5.5	.1	(*)	5.8	5.9	11.4
Jefferson	(*)	.7	1.2	1.9	.5	—	.7	1.2	3.1

Lewis	4.6	6.6	4.2	15.4	.7	—	18.1	18.8	34.2
Livingston	—	—	(*)	(*)	—	—	—	—	(*)
Madison	(*)	—	—	(*)	—	—	(*)	(*)	(*)
Montgomery	(*)	.6	—	.6	—	.1	2.1	2.2	2.8
Niagara	—	—	—	—	.2	—	1.2	1.4	1.4
Onondaga	.8	.8	3.2	4.8	(*)	—	5.3	5.3	10.1
Ontario	(*)	—	.5	.5	—	—	—	—	.5
Orleans	—	—	—	—	.1	—	.3	.4	.4
Oswego	.2	.9	2.0	3.1	(*)	—	10.0	10.0	13.1
Otsego	.3	(*)	8.8	9.1	—	.1	1.5	1.6	10.7
Rensselear	—	—	—	—	—	.9	6.3	7.2	7.2
St. Lawrence	18.2	3.9	5.5	27.6	3.3	—	7.4	10.7	38.3
Saratoga	.8	—	4.8	5.6	.9	2.6	18.7	22.2	27.8
Schenectady	—	—	—	—	—	.1	.7	.8	.8
Schoharie	—	—	—	—	—	.3	2.1	2.4	2.4
Schuyler	—	—	.1	.1	—	—	—	—	.1
Steuben	—	—	.4	.4	—	—	—	—	.4
Sullivan	—	—	—	—	—	—	(*)	(*)	(*)
Tioga	—	—	—	—	—	—	.1	.1	.1
Tompkins	(*)	—	.1	.1	—	—	—	—	.1
Warren	.4	—	(*)	.4	.4	6.0	29.4	35.8	36.2
Washington	.3	—	—	.3	.2	2.1	14.8	17.1	17.4
Wayne	.1	—	—	.1	.1	—	—	.1	.2
Wyoming	—	—	—	—	.5	—	1.0	1.5	1.5
Total	74.1	16.2	42.3	132.6	14.0	14.3	233.4	261.7	394.3

[1] Counties with no production are omitted.

* Less than 50 cords.

Table 17. — Round pulpwood production in Ohio by counties and species groups, 1967

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	—	—	0.1	5.0	0.5	5.6	5.6
Ashland	—	—	—	—	—	—	.7	.7	.7
Ashtabula	—	—	—	—	—	—	.6	.6	.6
Athens	—	(*)	(*)	(*)	.5	3.7	3.1	7.3	7.3
Belmont	—	—	—	—	—	—	.1	.1	.1
Brown	—	—	0.1	0.1	.2	2.0	1.3	3.5	3.6
Butler	—	—	.1	.1	.2	1.3	1.4	2.9	3.0
Carroll	—	—	—	—	—	—	.1	.1	.1
Champaign	—	—	—	—	—	—	.1	.1	.1
Clark	—	—	—	—	—	—	.1	.1	.1
Clermont	—	—	.1	.1	.1	.7	1.1	1.9	2.0
Clinton	—	—	.3	.3	1.9	1.5	3.8	7.2	7.5
Columbiana	—	—	—	—	—	1.0	.9	1.9	1.9
Coshocton	—	—	—	—	—	—	14.5	14.5	14.5
Crawford	—	—	—	—	—	—	(*)	(*)	(*)
Cuyahoga	—	—	—	—	—	—	.3	.3	.3
Delaware	—	—	—	—	.1	.7	.7	1.5	1.5
Erie	—	0.1	.1	.2	—	—	1.0	1.0	1.2
Fairfield	—	—	—	—	.1	.3	.5	.9	.9
Fayette	—	—	—	—	—	.2	.1	.3	.3
Franklin	—	—	—	—	.1	.2	.1	.4	.4
Gallia	0.3	.3	5.6	6.2	(*)	14.7	.1	14.8	21.0
Greene	—	—	.1	.1	.1	.5	1.0	1.6	1.7
Guernsey	—	—	—	—	—	—	5.7	5.7	5.7
Hamilton	—	—	—	—	—	—	.1	.1	.1
Harrison	—	—	—	—	—	—	.1	.1	.1

Highland	—	—	.1	.1	.2	3.9	1.1	5.2	5.3
Hocking	—	—	—	—	1.8	13.0	2.6	17.4	17.4
Holmes	—	—	—	—	—	—	1.4	1.4	1.4
Jackson	.1	.1	1.8	2.0	.3	27.4	.6	28.3	30.3
Knox	—	—	—	—	—	.1	2.5	2.6	2.6
Lawrence	.1	.1	.8	1.0	—	22.6	.1	22.7	23.7
Licking	—	—	—	—	(*)	.1	5.0	5.1	5.1
Logan	—	—	—	—	—	—	.2	.2	.2
Lorain	—	—	—	—	—	—	(*)	(*)	(*)
Medina	—	—	—	—	—	—	.3	.3	.3
Meigs	.1	.1	1.2	1.4	.1	1.6	.4	2.1	3.5
Monroe	—	—	—	—	—	—	(*)	(*)	(*)
Montgomery	—	—	.1	.1	.6	1.0	1.6	3.2	3.3
Morgan	—	—	(*)	(*)	—	—	1.4	1.4	1.4
Morrow	—	—	—	—	—	—	.4	.4	.4
Muskingum	—	—	—	—	—	—	7.4	7.4	7.4
Noble	—	—	—	—	—	—	.1	.1	.1
Perry	—	—	—	—	.4	2.8	2.1	5.3	5.3
Pickaway	—	—	—	—	(*)	.4	.2	.6	.6
Pike	(*)	(*)	(*)	(*)	(*)	11.7	1.6	13.3	13.3
Preble	—	—	.2	.2	.1	.7	1.0	1.8	2.0
Richland	—	—	—	—	—	—	.3	.3	.3
Ross	—	—	—	—	.2	9.0	.8	10.0	10.0
Scioto	(*)	(*)	.2	.2	.2	35.7	1.0	36.9	37.1
Stark	—	—	—	—	—	—	.3	.3	.3
Tuscarawas	—	—	—	—	—	—	2.0	2.0	2.0
Union	—	—	—	—	—	—	.1	.1	.1
Vinton	—	—	—	—	.5	20.2	1.0	21.7	21.7
Warren	—	—	.2	.2	.6	.6	.8	2.0	2.2
Washington	.1	.1	2.6	2.8	(*)	(*)	(*)	(*)	2.8
Wayne	—	—	—	—	—	—	.7	.7	.7
Wyandot	—	—	—	—	—	—	(*)	(*)	(*)
Total	0.7	0.8	13.6	15.1	8.4	182.6	75.0	266.0	281.1

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 18. — Round pulpwood production in Pennsylvania by counties and species groups, 1967

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	0.3	0.3	(*)	3.5	1.7	5.2	5.5
Armstrong	—	—	(*)	(*)	—	—	—	—	(*)
Bedford	0.1	0.3	7.9	8.3	4.7	17.1	14.3	36.1	44.4
Berks	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Blair	—	.2	1.2	1.4	(*)	2.2	5.4	7.6	9.0
Bradford	—	(*)	.1	.1	(*)	—	.5	.5	.6
Cambria	—	.1	1.9	2.0	—	1.8	3.4	5.2	7.2
Cameron	—	—	.1	.1	(*)	4.4	2.4	6.8	6.9
Centre	—	1.7	5.1	6.8	—	42.2	7.5	49.7	56.5
Clarion	—	—	(*)	(*)	(*)	.6	.6	1.2	1.2
Clearfield	—	2.3	7.3	9.6	(*)	43.9	22.6	66.5	76.1
Clinton	—	.3	1.3	1.6	—	16.0	1.9	17.9	19.5
Columbia	—	—	.7	.7	—	5.6	3.6	9.2	9.9
Crawford	—	—	—	—	(*)	1.1	8.7	9.8	9.8
Cumberland	—	—	.2	.2	—	3.4	1.5	4.9	5.1
Dauphin	—	—	.5	.5	—	1.8	2.4	4.2	4.7
Elk	—	.1	2.4	2.5	.1	4.5	24.0	28.6	31.1
Erie	—	—	—	—	—	—	1.5	1.5	1.5
Fayette	(*)	(*)	(*)	(*)	.9	3.4	5.7	10.0	10.0
Forest	—	—	2.4	2.4	(*)	1.0	4.0	5.0	7.4
Franklin	—	(*)	1.5	1.5	—	11.8	5.8	17.6	19.1
Fulton	(*)	(*)	3.6	3.6	.1	10.1	5.6	15.8	19.4
Huntingdon	—	3.2	16.7	19.9	—	17.7	22.6	40.3	60.2
Indiana	—	.1	.8	.9	—	.2	.6	.8	1.7

Jefferson	—	(*)	.1	.1	.1	.5	4.0	4.6	4.7
Juniata	—	.4	2.8	3.2	—	7.6	3.2	10.8	14.0
Lackawanna	—	—	—	—	—	—	(*)	(*)	(*)
Lancaster	—	—	.1	.1	—	1.0	.8	1.8	1.9
Luzerne	—	—	1.0	1.0	(*)	4.3	6.6	10.9	11.9
Lycoming	—	.1	.5	.6	.1	1.0	1.5	2.6	3.2
McKean	—	(*)	1.3	1.3	—	—	33.0	33.0	34.3
Mercer	—	—	—	—	—	—	.1	.1	.1
Mifflin	—	.2	.5	.7	—	.5	1.0	1.5	2.2
Monroe	—	—	(*)	(*)	—	.2	—	.2	.2
Montour	—	—	.1	.1	—	3.5	.8	4.3	4.4
Northumberland	—	—	3.0	3.0	—	6.3	2.7	9.0	12.0
Perry	—	.1	2.3	2.4	—	7.5	1.8	9.3	11.7
Potter	—	(*)	.2	.2	—	(*)	3.4	3.4	3.6
Schuylkill	—	—	1.7	1.7	—	6.0	4.6	10.6	12.3
Snyder	—	(*)	1.9	1.9	—	7.7	1.9	9.6	11.5
Somerset	(*)	.2	1.8	2.0	3.4	10.9	16.2	30.5	32.5
Sullivan	—	—	—	—	(*)	—	.1	.1	.1
Susquehanna	—	(*)	—	(*)	(*)	—	1.4	1.4	1.4
Tioga	—	.1	.3	.4	.2	.1	3.7	4.0	4.4
Union	—	—	1.5	1.5	—	16.6	2.8	19.4	20.9
Venango	—	—	—	—	(*)	5.6	5.6	11.2	11.2
Warren	—	—	.9	.9	(*)	2.5	12.4	14.9	15.8
Washington	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Wayne	—	—	—	—	—	—	2.2	2.2	2.2
Westmoreland	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Wyoming	—	—	—	—	(*)	—	.2	.2	.2
York	—	—	1.0	1.0	—	4.3	2.0	6.3	7.3
Total	0.1	9.4	75.0	84.5	9.6	278.4	258.3	546.3	630.8

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 19. — Round pulpwood production in Rhode Island by counties and species groups, 1967
(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Bristol	—	—	—	—	—	—	—	—	—
Kent	—	—	1.5	1.5	—	1.4	0.4	1.8	3.3
Newport	—	—	—	—	—	—	—	—	—
Providence	—	—	2.5	2.5	—	.5	.2	.7	3.2
Washington	—	—	.6	.6	—	.4	.2	.6	1.2
Total	—	—	4.6	4.6	—	2.3	0.8	3.1	7.7

Table 20. — Round pulpwood production in Vermont by counties and species groups, 1967

(In thousand rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Addison	2.2	—	—	2.2	0.6	—	1.8	2.4	4.6
Bennington	.3	—	—	.3	(*)	(*)	3.0	3.0	3.3
Caledonia	11.9	1.0	0.5	13.4	(*)	—	1.9	1.9	15.3
Chittendon	(*)	—	1.4	1.4	.3	—	1.8	2.1	3.5
Essex	37.1	.8	.5	38.4	.4	—	15.8	16.2	54.6
Franklin	1.5	(*)	(*)	1.5	—	—	1.1	1.1	2.6
Grand Isle	—	—	—	—	—	—	—	—	—
Lamoille	3.8	(*)	—	3.8	—	—	.3	.3	4.1
Orange	1.3	.1	.1	1.5	—	—	.1	.1	1.6
Orleans	11.9	.7	.3	12.9	(*)	—	1.3	1.3	14.2
Rutland	3.9	—	—	3.9	.1	—	4.2	4.3	8.2
Washington	2.2	—	1.0	3.2	—	—	.4	.4	3.6
Windham	4.9	—	—	4.9	.2	—	.1	.3	5.2
Windsor	6.3	.1	—	6.4	.1	—	.2	.3	6.7
Total	87.3	2.7	3.8	93.8	1.7	(*)	32.0	33.7	127.5

* Less than 50 cords.

Table 21. — Round pulpwood production in West Virginia by counties and species groups, 1967

(In thousand rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Berkeley	(*)	(*)	7.1	7.1	—	3.1	1.4	4.5	11.6
Boone	—	—	—	—	(*)	.1	(*)	.1	.1
Cabell	0.1	0.1	.4	.6	—	—	—	—	.6
Calhoun	.1	(*)	.2	.3	(*)	(*)	(*)	(*)	.3
Doddridge	.1	.1	.3	.5	(*)	(*)	(*)	(*)	.5
Fayette	—	—	(*)	(*)	(*)	.1	—	.1	.1
Gilmer	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Grant	1.3	.7	5.1	7.1	6.5	24.6	13.8	44.9	52.0
Greenbrier	(*)	.3	1.7	2.0	7.9	12.6	11.0	31.5	33.5
Hampshire	3.1	1.5	17.2	21.8	5.8	21.9	11.8	39.5	61.3
Hardy	1.3	.7	5.2	7.2	3.1	11.9	6.5	21.5	28.7
Harrison	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Jackson	.5	.2	1.6	2.3	(*)	.1	(*)	.1	2.4
Kanawha	(*)	(*)	(*)	(*)	—	(*)	(*)	(*)	(*)
Lincoln	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
McDowell	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Marion	—	—	(*)	(*)	—	—	—	—	(*)
Marshall	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Mason	.6	.3	2.2	3.1	(*)	.1	(*)	.1	3.2

Mineral	.9	.4	3.0	4.3	3.6	13.3	7.3	24.2	28.5
Monongalia	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Monroe	.1	.6	3.3	4.0	7.0	11.2	9.8	28.0	32.0
Morgan	.7	.4	11.7	12.8	.5	10.0	3.7	14.2	27.0
Nicholas	(*)	(*)	.1	.1	.1	.3	.2	.6	.7
Pendleton	.2	.1	1.4	1.7	.4	1.6	1.1	3.1	4.8
Pleasants	.1	(*)	.3	.4	—	(*)	(*)	(*)	.4
Pocahontas	.2	.3	1.7	2.2	2.9	6.0	4.5	13.4	15.6
Preston	(*)	(*)	.1	.1	.8	2.8	1.5	5.1	5.2
Putnam	.9	.4	3.0	4.3	—	—	—	—	4.3
Randolph	(*)	(*)	.1	.1	.4	1.4	.8	2.6	2.7
Ritchie	.4	.2	1.4	2.0	(*)	.1	(*)	.1	2.1
Roane	(*)	(*)	.1	.1	—	(*)	(*)	(*)	.1
Summers	(*)	.1	.6	.7	.4	.6	.6	1.6	2.3
Taylor	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Tucker	(*)	(*)	.1	.1	.8	2.8	1.5	5.1	5.2
Tyler	(*)	(*)	(*)	(*)	—	(*)	(*)	(*)	(*)
Wayne	(*)	(*)	.1	.1	—	—	—	—	.1
Webster	—	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Wirt	.3	.2	1.0	1.5	—	—	—	—	1.5
Wood	1.2	.6	4.3	6.1	.1	.2	.1	.4	6.5
Total	12.1	7.2	73.3	92.6	40.3	124.8	75.6	240.7	333.3

[1] Counties with no production are omitted.

* Less than 50 cords.

Active woodpulp mills in the Northeast, 1967.

Number	Mill and Location	Capacity[1]
		(Tons/24 hrs.)
	CONNECTICUT	
1.	Tilo Company, Inc., Stratford	30
	KENTUCKY	
2.	Wescor Corporation, Hawesville	Unknown
	MAINE	
3.	Standard Packaging Corp., Eastern Fine Paper and Pulp Div., Brewer[2]	172
4.	Standard Packaging Corp., Eastern Fine Paper and Pulp Div., Lincoln[2]	210
5.	Great Northern Paper Co., E. Millinocket	1,070
6.	Great Northern Paper Co., Millinocket	1,375
7.	Hudson Pulp and Paper Corp., Kennebec Div., Augusta	270
8.	International Paper Corp., Chisholm	225
9.	International Paper Corp., Jay	675
10.	International Paper Corp., Livermore Falls	95
11.	Kennebec River Pulp and Paper Co., Madison	170
12.	Keyes Fibre Co., Shawmut	100
13.	Oxford Paper Co., Rumford	670
14.	Pejepscot Paper Co., Brunswick	115
15.	Penobscot Co., Old Town	550
16.	St. Croix Paper Co., Div. of Georgia-Pacific Corp., Woodland	1,100
17.	St. Regis Paper Co., Printing Paper Div., Bucksport	325
18.	Scott Paper Co., Winslow	415
19.	U. S. Gypsum Co., Lisbon Falls	100
20.	Scott Paper Co., S. D. Warren Div., Cumberland Mills	250
	MARYLAND	
21.	West Virginia Pulp and Paper Co., Luke	800
	MASSACHUSETTS	
22.	Oxford Paper Co., Lawrence	50
	NEW HAMPSHIRE	
23.	Brown Co., Berlin	940
24.	Franconia Paper Co., Lincoln	90
25.	Groveton Papers Co., Groveton	425
	NEW JERSEY	
26.	The Philip Carey Mfg. Co., Perth Amboy	50
27.	Johns-Manville Products Corp., Manville	200
28.	Ruberoid Co., Gloucester City	192

CONTINUED

Number	Mill and Location	Capacity[1]
		(Tons/24 hrs.)
	NEW YORK	
29.	Armstrong Cork Co., Fulton	260
30.	The Celotex Corp., Deposit	Unknown
31.	Diamond International Corp., Ogdensburg	50
32.	Diamond International Corp., Plattsburg	50
33.	Finch-Pruyn and Co., Glens Falls	135
34.	The Flintkote Co., Lockport	12
35.	Georgia-Pacific Corp., Gould Paper Div., Lyons Falls	120
36.	Georgia-Pacific Corp., Plattsburg	70
37.	Imperial Paper Co., Plattsburg	35
38.	International Paper Co., Corinth	225
39.	International Paper Co., N. Tonawanda	140
40.	International Paper Co., Ticonderoga	190
41.	Kimberly-Clark Corp., Niagara Falls	100
42.	J. P. Lewis Co., Beaver Falls	30
43.	St. Regis Paper Co., Deferiet	300
44.	West Virginia Pulp and Paper Co., Mechanicville	158
	OHIO	
45.	The Philip Carey Mfg. Co., Cincinnati	100
46.	Container Corp. of America, Circleville	240
47.	Johns-Manville Products Co., Avery	50
48.	Logan-Long Co., Franklin	60
49.	The Mead Corp., Chillicothe	570
50.	Stone Container Corp., Coshocton	300
	PENNSYLVANIA	
51.	The Celotex Corp., Philadelphia	160
52.	The Celotex Corp., Sunbury	150
53.	Charmin Paper Products Co., Mehoopany	Unknown
54.	Combined Paper Mills, Bare Mill Div., Roaring Spring	180
55.	Certain-Teed Products Corp., York	75
56.	Hammermill Paper Co., Erie	400
57.	Hammermill Paper Co., Lock Haven	70
58.	New York and Pennsylvania Co., Johnsonburg Div., Johnsonburg	270
59.	West Virginia Pulp and Paper Co., Tyrone	152
60.	West Virginia Pulp and Paper Co., Williamsburg	160
	RHODE ISLAND	
61.	Bird and Son, Inc., Phillipsdale	250
	VERMONT	
62.	Standard Packaging Corp., Missisquoi Specialty Board Div., Sheldon Springs	44
	Estimated Total Capacity	15,770

[1] Source: LOCKWOOD'S DIRECTORY OF PAPER AND ALLIED TRADES, 1968, and other sources.
[2] These mills became idle in March 1968.

THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

The TIMBER RESOURCES of the OHIO HILL COUNTRY

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U.S.D.A. FOREST SERVICE RESOURCE BULLETIN NE-14
1969

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

FOREWORD

THIS report presents 1967 forest resource statistics for the Hill Country—Ohio's portion of Appalachia. The Hill Country comprises 28 counties, which were divided into three geographic sampling units for this survey. The Hill Country of the 1952 Ohio forest survey contained 26 of these counties. The additional Appalachia counties are Brown and Clermont in the South-Central Geographic Unit. The Southeastern and East-Central Units are the same as they were in the first survey. To facilitate making comparisons between inventories, we have adjusted 1952 Hill Country data to include Brown and Clermont Counties.

The resurvey of Ohio forests is part of the nationwide program to maintain a current inventory of our timber resources, as authorized by the McSweeney-McNary Forest Research Act of 1928. Because forestry is so important in the Hill Country, the resurvey there was intensified to obtain more precise county information. The appropriation of $75,000 by the Ohio State Legislature made the intensification possible.

The Division of Forestry and Reclamation of the Ohio Department of Natural Resources and the U.S.D.A. Forest Service planned the resurvey. Carl E. Mayer, project leader, directed the resurvey. Joseph E. Barnard was in charge of computing and tabulating all inventory data, including those for the Wayne National Forest, which were collected by personnel of the Eastern Region of the U.S.D.A. Forest Service. Members of the Northeastern Forest Experiment Station's survey unit collected the basic inventory data for all lands outside the Wayne National Forest. With the assistance of Division of Forestry and Reclamation personnel, they collected timber cut and timber products output data. The field work was completed in December 1967.

We acknowledge, with special thanks the cooperation of the Agricultural Stabilization and Conservation Service, who provided up-to-date aerial photographs for use in the resurvey.

The TIMBER RESOURCES of the OHIO HILL COUNTRY

■

The Authors

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ROGER E. McCAY received his bachelor of science degree in forestry from Iowa State University in 1966. The same year he joined the Northeastern Forest Experiment Station forest survey project, as a research forester. He worked on the photo-interpretation, field-data collection, and analysis phases of the Ohio Forest Survey.

The Hill Country of Ohio and the geographic sampling units used for the resurvey.

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RESOURCE TRENDS

THE FIRST comprehensive forest survey in Ohio, conducted from 1951 to 1953, was made at an ideal time to reflect the return to forest of previously farmed or cutover lands, to evaluate some of the practices promoted by the conservation movement that gained force in the 1900's, and to assess the results of the demands World War II had made on Ohio forests.

The survey pointed to an upturn in forest area. It indicated that, although northern and western Ohio contained scattered tracts of sawtimber, most of Ohio's 5.4 million acres of commercial forest land[1] were in the Hill Country and that most of them were in poletimber stands. Apparently the combination of reverting forests, fire protection, and wartime cutting had had a great impact on the Hill Country.

The 1952 survey sugested that additions to forest land in southeastern Ohio would, for a time, balance losses in the rest of the State; that a rapid buildup of sawtimber volume would occur in the Hill Country; and that the need for better forest management, long advocated, must be revoiced to get "increased production from the available forest land."[2]

Fifteen years have passed—not long in the history of Ohio's forests, but enough time to observe current trends. The new forest survey indicates that forest area in the Hill Country has increased at a rate greater than that anticipated in 1952. The increase has more than offset the land clearing that took place in western Ohio during the early 1960's and has added prominence to the Hill Country in the State's timber outlook.

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[1] See appendix for definitions of this and other terms used in this report.

[2] Hutchison, O. Keith, and James T. Morgan. OHIO'S FORESTS AND WOOD-USING INDUSTRIES. USDA Forest Serv. Central States Forest Expt. Sta. Forest Survey Release 19. 40 pp., illus. Columbus, Ohio. 1956.

The sawtimber buildup predicted in 1952 has materialized in the Hill Country, mainly in trees 12 to 16 inches d.b.h. In addition, there is a good crop of healthy young poletimber trees. As they mature, these trees will continue the already favorable increase of sawtimber volume and, at the same time, will be replaced by young growth on forest land that is currently restocking.

Thus the trends suggested by the 1952 survey have been and are taking place. But the need for additional forest management remains. Using the information from this latest survey, we will be able to further evaluate resource trends and to determine possible problem areas requiring management.

INVENTORY HIGHLIGHTS

- Commercial forest area increased by one-third: from 3.3 million acres in 1952 to 4.4 million acres in 1967.
- Commercial forest land now covers one-half of the Hill Country.
- Volume of growing stock increased 30 percent between inventories and now amounts to 2.9 billion cubic feet.
- Volume of sawtimber is 9.8 billion board feet—32 percent more than in 1952.
- Average net annual growth of growing stock exceeded 100 million cubic feet between 1952 and 1967.
- Net annual growth of sawtimber averaged more than 340 million board feet.

THE FOREST SITUATION

One-Third More Forest

Since 1952 the area of forest land in the Hill Country increased from 3.3 to 4.4 million acres. Much of the increase resulted from abandoned farmland reverting to forests and from strip-mine reclamation. This is especially true in the East-Central Geographic Unit, where the increase of nearly 600 thousand acres of forest land accounts for more than half of that found in the Hill Country.

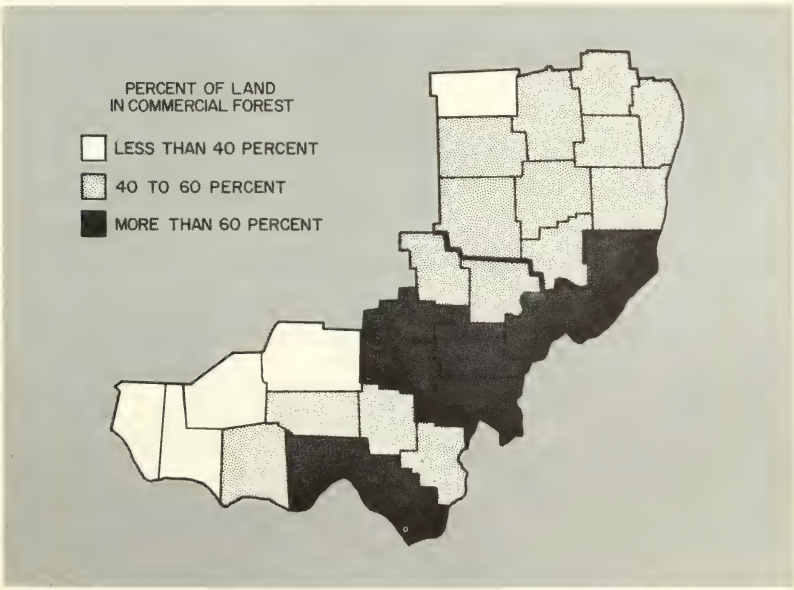
Every county in the Region but Adams gained forest area between surveys. In general, those with the least forest in 1952 showed the greatest gains. Forest area more than doubled in Noble County and nearly doubled in Carroll, Harrison, and Holmes Counties.

As a result of this buildup in forest area, the Hill Country, covering only one-third of Ohio, accounts for about 70 percent of the State's woodlands.

Half of Hill Country Is Now Forested

Forests, nearly all of which are commercial, now cover half the land area in southeastern Ohio. Noncommercial forest land amounts to only 35 thousand acres and consists entirely of publicly owned forest land that is reserved for timber production. No forest land in the Hill Country is considered unproductive because of adverse site conditions.

The highest concentration of commercial forest land is in the Southeastern Unit.



The Southeastern Geographic Unit still has the highest concentration of commercial forest land, although each of the other two units has more forest land. Vinton County, with 74 percent of its area in commercial forest, is still the most densely forested county in Ohio; however, seven other counties are now 60 percent or more forested—Athens, Hocking, Lawrence, Meigs, Monroe, Scioto, and Washington. Scioto, with 259,500 acres, has more commercial forest land than any other Ohio county.

Only five of the 28 southeastern Ohio counties are less than 40 percent forested. This indicates that, in addition to expanding, forest area in the Hill Country is becoming more evenly distributed.

Fifty-Six Percent of Forest Is in Sapling-Seedling Stands

According to present standards, 2.4 million acres of Hill Country forests are now classified as sapling-seedling stands (restocking), and only 1.3 million acres are classified as sawtimber stands. At first glance the area in sapling-seedling stands appears to have increased about 4½ times since the first survey, while the area in sawtimber appears to have dropped slightly. However, the stand-size classifications used in the resurvey are different from those used in the original survey.[3] Therefore the stand-size data in this report cannot be compared directly with similar data from the first survey.

Most of the stands now classified as sapling-seedling are lands that have reverted to forest and contain little or no merchantable volume. But many of them are stands that contain a high proportion of rough or rotten trees. In stands of this sort, if the stocking of saplings and seedlings exceeds that of larger growing-stock trees, the stands are now classed as sapling-seedling. They may have sufficient volume per acre to have been called poletimber or sawtimber stands according to the 1952 definitions. Actually, one of every 2 acres of commercial forest land in the Hill Country now contains at least 1,500 board feet of sawtimber

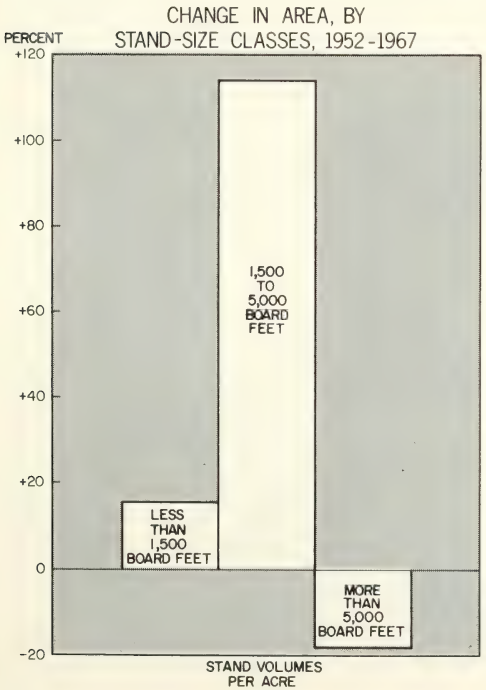
[3] In the 1967 survey, stand-size classifications were based on stocking by growing-stock trees. In the 1952 survey they were based primarily on volume per acre.

and thus meets the minimum formerly used to class sawtimber stands. The area in these stands represents an increase of 50 percent between surveys.

Regardless of how they are classed, a closer look at many of the Hill Country stands indicates that widespread management—planting or brush control in restocking stands and timber stand improvement or regeneration cutting in larger timber—is needed to get the stands into optimum production in the least time.

Area of Large Sawtimber is Declining

The increase in area of stands with 1,500 or more board feet per acre might better be called a net increase or net change. Actually, the area in small sawtimber stands—those averaging between 1,500 to 5,000 board feet per acre—has more than doubled since 1952; but the area in large sawtimber stands—those with



The area in large sawtimber stands has declined.

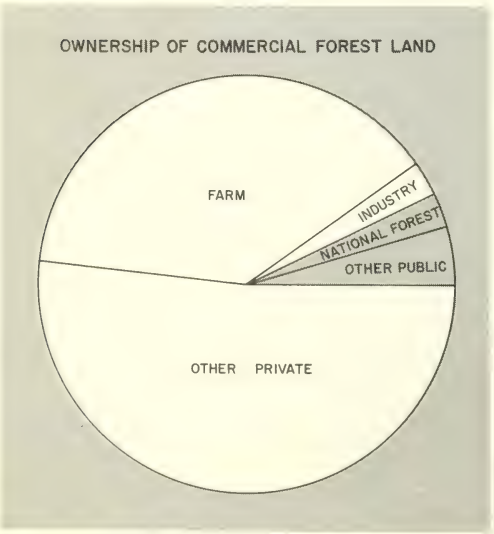
more than 5,000 board feet per acre—has declined by about one-fifth. This means that young sawtimber stands are developing to replace many of the mature and overmature stands that are being harvested.

Nonfarm Owners Are Increasing

Ninety-three percent of the commercial forest land in southeastern Ohio is privately owned. The remaining 7 percent—304 thousand acres—is publicly owned. Thus, the ratio of public to private ownership has not changed since 1952.

About one-third of the publicly owned commercial forest land is in the Wayne National Forest. The other two-thirds are held by other public owners, primarily the Ohio Department of Natural Resources. This breakdown, too, has remained the same since the first survey.

A trend away from farmer-owners has developed within the private sector, where most of the expansion in commercial forest area took place. During the past 15 years the amount of commercial forest land owned by farmers increased by 250 thousand acres, while that owned by nonfarmers increased by 780 thou-



Over 90 percent of the commercial forest land is privately owned.

sand acres—more than 3 times as much. During the same period the land in farms in southeastern Ohio declined by about one-fourth[4]. These trends indicate a continued buildup of forest area as trees invade land that formerly had been cropped or pastured. They also suggest possible shifts in objectives for the use of the land as it becomes the property of a more diverse group of owners.

Annual Growth Exceeds 100 Million Cubic Feet

The average net annual growth between 1952 and 1967 in southeastern Ohio was 104 million cubic feet for growing stock and 341 million board feet for sawtimber. Expressed as a percent of 1967 inventory volumes, this average net annual growth amounts to rates of 3.6 percent for growing stock and 3.5 percent for sawtimber. Ingrowth accounts for most of the growth in each of these two volume classes.

Mortality, used in part to determine the average net annual growth, averaged less than 1 percent. However, elm mortality was 3 percent annually, mainly because of Dutch elm disease.

Growth Is Below Potential

The average net annual growth per acre is now less than 25 cubic feet, well below the region's potential. Over three-fifths of the Hill Country timberland is capable of producing more than 50 cubic feet per acre per year, and almost one-fourth could produce more than 85 cubic feet per acre per year (potential expressed in terms of mean annual growth at culmination of increment in fully stocked stands). However, little more than half of the commercial forest acres are well stocked with growing-stock trees. Stocking must be improved before the region's full growth potential can be realized.

Growth Exceeds Removals

Timber growth, despite being below potential, has exceeded average annual timber removals by a wide margin during the past

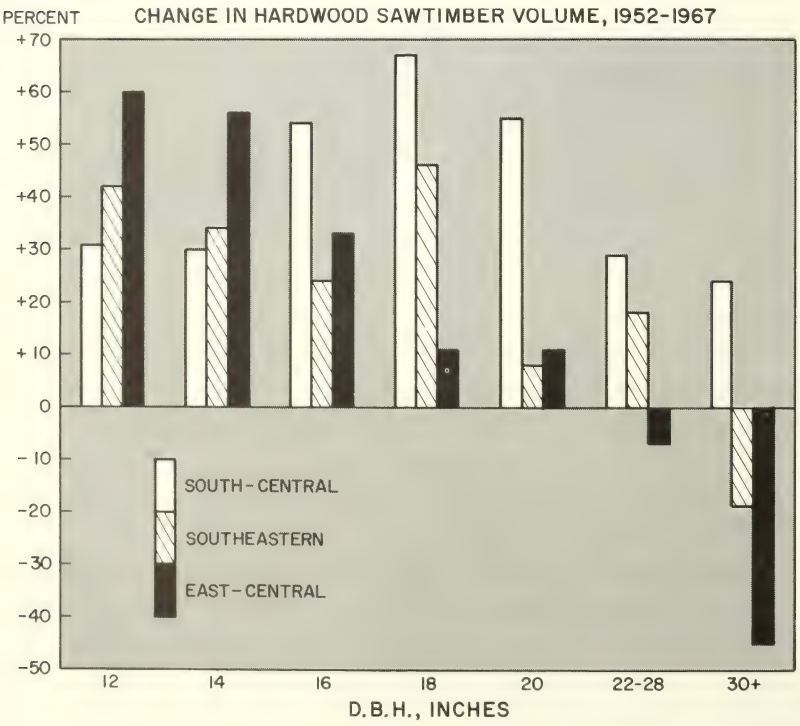
[4] U. S. Bureau of the Census. Census of Agriculture, 1964.

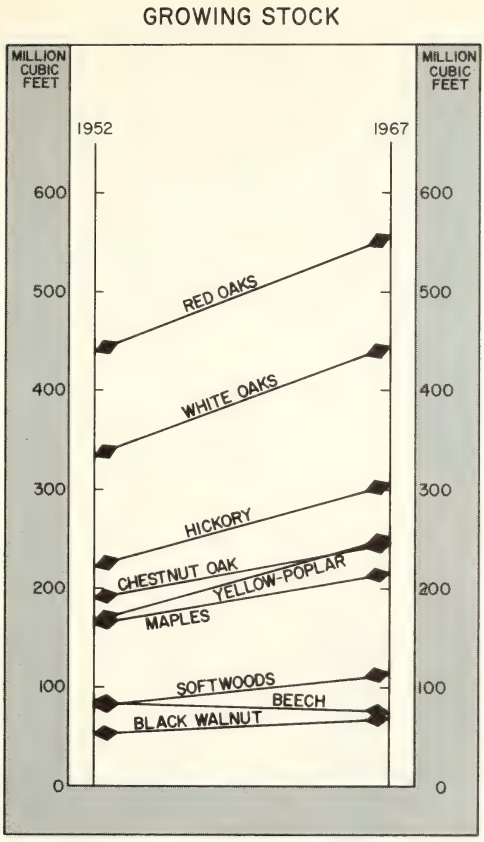
15 years. Annual removals have averaged 42 million cubic feet for growing stock and 131 million board feet for sawtimber. Thus the growth-to-cut surplus has increased the growing-stock and sawtimber volumes in the region by 2 percent annually. However, most of the growth has been in poletimber and small sawtimber trees while much of the cut has been from large sawtimber trees. As a result there has been a general thickening up of the forest stands in the Hill Country.

Timber Volume Up

Growing-stock volume increased by 30 percent between surveys and now totals 2.9 billion cubic feet. Included in the growing stock are 9.8 billion board feet of sawtimber—up 32 percent since 1952. These increases, although substantial, have not been

Only in the South-Central Unit was sawtimber volume added in all diameter classes.





The major species showed substantial increases in growing-stock volume.

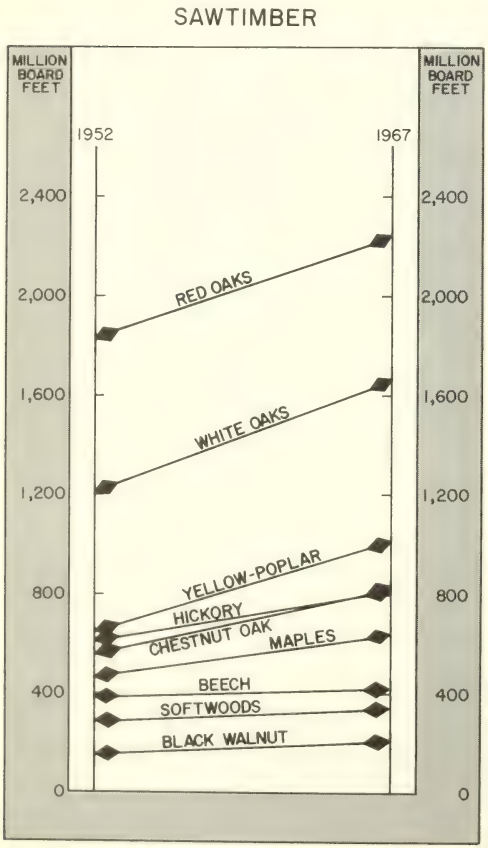
uniform. Important changes have taken place in the distribution of timber volume by tree size and by location.

Healthy volume increases have occurred across all diameter classes except the largest, where cutting and mortality have been concentrated. However, the most rapid volume buildup has taken place in the smaller diameter classes. In fact, trees 16 inches d.b.h. and smaller account for more than 80 percent of the increases in growing-stock and sawtimber volumes.

The changes in volume distribution are even more pronounced at the geographic unit level. Growing-stock volumes have increased by about the same proportion in each of the three sampling units, but sawtimber volumes have not. In the South-Central

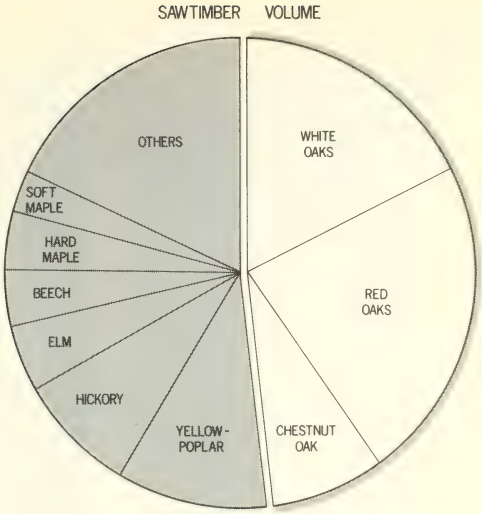
Unit, where forest area increased only slightly, sawtimber volume increased by about 40 percent. Only in the South-Central Unit was sawtimber volume added in all diameter classes. In the East-Central Unit, where forest area expanded by more than 55 percent, sawtimber volume increased by only 25 percent.

Except for beech, major species all showed substantial volume increases between 1952 and 1967. Especially noteworthy are the gains in sawtimber volume of yellow-poplar (58 percent) and black walnut (30 percent). Remember, however, that species distributions, like distributions by tree size, are not uniform throughout the Region. Similarly, the increase in volume for any given species may vary considerably from one part of the Hill Country to another.



Most species showed gains in sawtimber volume.

The oaks make up nearly half the sawtimber volume.



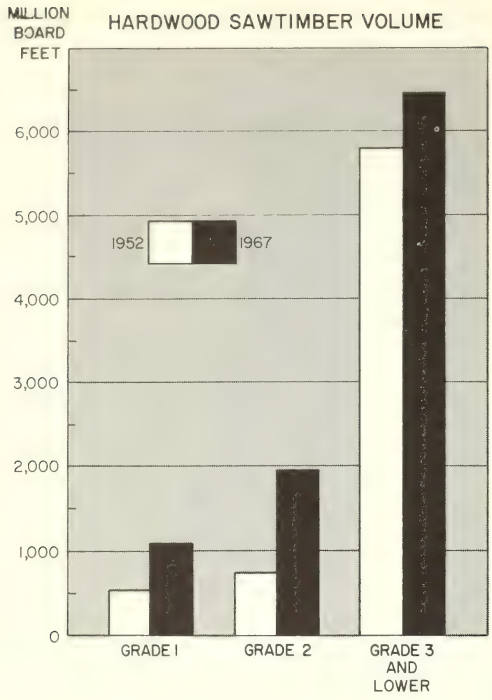
Oaks Predominate

The Hill Country is hardwood country. Nearly nine-tenths of the forest land is in hardwood forest cover types—mainly oak-hickory. The oaks make up more than two-fifths of the growing-stock volume and nearly half of the sawtimber volume. Volume in the red oak group is approximately equal to that of the white oaks and chestnut oak combined. These species, along with hickory and yellow-poplar, account for more than 60 percent of the merchantable timber.

Comparisons between surveys indicate that the area in pine and oak-pine types has increased by two and one-half times and now amounts to more than 500 thousand acres. Nearly half the increase took place in the East-Central Unit. The East-Central Unit also accounts for almost three-fourths of the increase in softwood growing-stock volume.

Timber Quality Is Improving

Two-thirds of the sawtimber volume is in low-grade material. However, much of the volume in standard lumber log grade 3 is classified as such simply on the basis of size—two-thirds of the



Although log quality is improving, two-thirds of the sawtimber volume is classed as grade 3 or lower.

sawtimber volume in southeastern Ohio is in trees less than 17 inches d.b.h. As these trees grow larger, many of them will increase in quality.

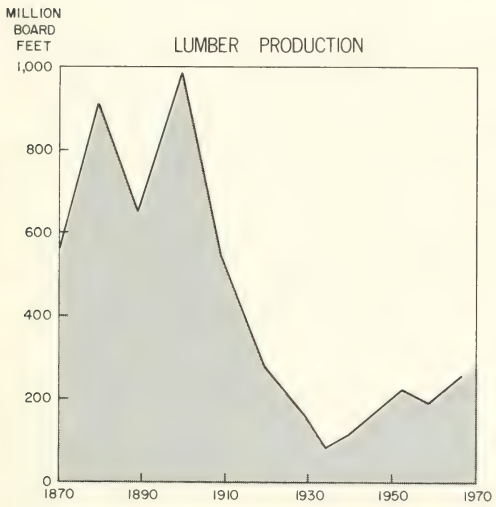
About 12 percent of the hardwood sawtimber volume is in standard lumber log grade 1, and about 20 percent is in standard lumber log grade 2. The total volume in these two grades (3.1 billion board feet) has more than doubled during the past 15 years. Remember, however, that although the overall timber quality situation is improving in the Hill Country, the distribution of volume by log grade varies with species and location.

TIMBER INDUSTRY TRENDS

Lumber Production Is Increasing

Most of the Hill Country's primary wood-using firms are sawmills—more than 200 scattered throughout the Region. Their total lumber output exceeded 180 million board feet in 1966.

This single year output should not be confused with the average annual timber removal for the 15 years—131 million board feet. The difference between the two figures simply indicates that the 1966 lumber production in the Hill Country was greater than the average annual removal of sawtimber for all purposes between surveys. Actually, lumber production has been increasing in the Hill Country for the past several years. This trend has been noted for the State as a whole. At the same time, the number of sawmills has declined. In 1952 the average output per sawmill in Ohio was only about 100,000 board feet annually. In 1966 the average output per mill in the Hill Country was more than 850,000 board feet.



Lumber production has been increasing in Ohio for the past several years.

Pulpwood Production Is Expanding Rapidly

Ohio's 1966 round pulpwood production, 337,000 cords, represents a ten-fold increase over that in 1952. Eighty-eight percent of the round pulpwood harvest came from the Hill Country. The Region also supplied most of the 39,000 cords of pulp chips produced in the State in 1966. The round pulpwood and chips were

consumed by woodpulp mills both within (two of Ohio's six mills are in the Hill Country) and outside the State.

As a result of the tremendous increase in southeastern Ohio's pulpwood production, the pulpwood industry now rivals the lumber industry in terms of volume produced. The implications of continued expansion in the pulpwood industry are important to the Hill Country, not only in the strict economic sense, but also because the pulp market provides an outlet for small timber. The lack of such a market has hindered the adoption of forest-management practices in many areas of the Midwest.

A LOOK TO THE FUTURE

Up to now we have described the Hill Country forests, pointed out some of the trends in their development and in the development of the region's forest industries, and indicated some needs for possible forest management activities. But what about the outlook for the Hill Country woodlands?

We can expect the buildup in the region's forest base to continue. Forest area should continue to increase at the current rate of about 2 percent annually—at least through the next decade.

Decline of agriculture, the shift toward nonfarm land ownership, and strip-mine reclamation will account for the forest area increases. However, we might expect the increase to drop to a lower rate, or even cease, sometime before the turn of the century because of population pressures and a demand for additional recreation land. Of more immediate importance in large areas of the Hill Country are current developments in the use of larger earthmoving equipment in strip-mining. The use of such equipment, making deeper coal seams accessible, could greatly affect the forest patterns in those areas: first, through timber removals, and second, through subsequent additions to forest area by natural regeneration or reclamation.

The current surplus of growth over cut indicates that the timber volume should continue to increase. In addition, poletimber ingrowth in stands that are currently restocking will further expand the region's growing-stock volume. Thus we can expect the poletimber buildup to accelerate, and the already favorable increase

in sawtimber volume to continue. Timber quality should also improve, but at a lower rate than the overall increase in sawtimber volume.

The anticipated increases in forest area and timber volume will not, in themselves, promote the widespread development of the timber industry, although they may encourage certain firms to expand production or to locate in the region. In other words, the demand for timber will not necessarily grow in proportion to the supply.

The demand for Hill Country timber depends primarily on the quantity of forest products that can be profitably marketed by primary wood-using firms that obtain their raw materials from the region. Much of the present timber supply cannot be profitably manufactured into products; so there is little demand for it. Much of it is too small or too poor in quality. Some species have little use. In many areas desirable trees are thinly scattered, and merchantable stands are located too far from possible users. Unless forest-management activities are stepped up in the region, the future timber supply may well fall short of the potential demand.

Many of the influences that will determine the potential demand for Hill Country timber have already begun working. Because the large number of round pulpwood and lumber-producing firms in the area have relatively few markets for their products, no one firm has been able to command the sale price of its output. The existing firms and others interested in developing timber industries in the Hill Country are undertaking various alternatives to increase profits and to promote resource use. They are seeking out additional markets, improving marketing systems for current poducts, and encouraging the manufacturers of secondary products to locate in the area. The likely alternative for most of the existing firms has been to direct their efforts at lowering production costs. For most this has meant capital investment for equipment to increase utilization and production efficiency and has resulted in an expansion in plant capacity.

These trends are expected to continue and, with them, the added demand for timber. To insure the kind and amount of raw

materials future wood-using firms will need, more of the timber owners will have to become timber producers.

Present conditions in the Hill Country favor the mutual development of timber supplies and forest industry demand. The forests are spread rather evenly, and the volume is distributed fairly well by size class. Many of the stands are at an age where cultural operations are both needed and feasible. The region's pallet and pulpwood-producing firms currently provide an outlet for the type of material removed in such operations. The suitability of the Hill Country's future timber will be determined by the willingness of forest land owners to match the development of the region's timber users.

■

APPENDIX

DEFINITIONS OF TERMS

Land Area Classes

Land area.—(a) *Bureau of the Census.* The area of dry land and land that is temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals that are less than ⅛ statute mile in width; and lakes, reservoirs, and ponds that are less than 40 acres in area. (b) *Forest Survey.* The same as the Bureau of the Census, except that the minimum width of streams, etc., is 120 feet, and the minimum size of lakes, etc., is 1 acre.

Forest land.—Land that is at least 10 percent stocked (contains at least 7.5 square feet of basal area) by forest trees of any size, or formerly had such tree cover, and is not developed for nonforest use. (Forest trees are woody plants that have a well developed stem and are usually more than 12 feet in height at maturity.)

Commercial forest land.—Forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization. *(Industrial wood:* all roundwood products, except fuelwood.)

Noncommercial forest land.—Forest land that is incapable of yielding timber crops because of adverse site conditions (unproductive forest land), and productive forest land that is withdrawn from commercial timber use through statute or administrative regulations (productive-reserved forest land).

Productive-reserved forest land.—Forest land that is sufficiently productive to qualify as commercial forest land, but is withdrawn from timber utlization through statute or administrative designation.

Unproductive forest land.—Forest land that is incapable of producing 20 cubic feet per acre of industrial wood under natural conditions because of adverse site conditions.

Nonforest land.—Land that has never supported forests; and land formerly forested but now in nonforest use such as crops, pasture, urban areas, and the like.

Ownership Classes

National forest.—Federal lands that have been legally designated as National Forests or purchase units, and other lands that are under the administration of the Forest Service.

Other public.—Public lands (other than those classified as National Forest) owned by Federal, state, county, and local public agencies, or lands leased by such governmental units for more than 50 years.

Other Federal.—Federal lands other than National Forests that are administered by other Federal agencies.

State.—Lands that are owned by the State of Ohio or leased to the State for 50 years or more.

County and municipal.—Lands that are owned by counties and local public agencies or municipalities or leased to them for 50 years or more.

Forest industry.—Lands that are owned by companies or individuals operating wood-using plants.

Farmer-owned.—Lands that are owned by farm operators. Excludes land leased by farm operators from nonfarm owners.

Miscellaneous private.—Privately owned lands other than forest-industry and farmer-owned lands.

Stand-size Classes

Stand.—A growth of trees on a minimum of 1 acre of forest land that is at least 16.7 percent stocked by forest trees of any size.

Sawtimber stands.—Stands that are at least 16.7 percent stocked with growing-stock trees (see definitions under Tree Classes), with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands that are at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands.—Stands that are at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

Nonstocked areas.—Commercial forest lands that are less than 16.7 percent stocked with growing-stock trees.

Stocking Classes

Stocking.—The degree of occupancy of land by trees, measured in terms of basal area and/or the number of trees in a stand compared to the basal area and/or number of trees required to utilize fully the growth potential of the land. The actual stocking at a point was evaluated against a standard of 75 square feet of basal area per acre. The stocking percentage for a sample plot is derived from the stocking for each of 10 points. Two categories of stocking were used:

- All live trees.—These are used in the classification of forest land and forest types.
- Growing-stock trees.—These are used in the classification of stand-size classes.

The degree of plot stocking is viewed as a range of values rather than single points. A fully stocked stand lies within the range of 100 to 133 percent of the basal-area standard. An overstocked stand contains more than 133 percent of basal-area standard. The range for medium stocking is 16.7

to 60 percent of the basal-area standard. Forest land with less than 16.7 percent of the basal-area standard is classified as nonstocked.

Tree Classes

Growing-stock trees.—Live trees of commercial species that are classifiedr as sawtimber, poletimber, saplings, and seedlings; that is, all live trees except rough and rotten trees. (See definitions under Class of Timber.)

Acceptable trees.—Growing-stock trees of commercial species that meet specified standards of size and quality, but do not qualify as desirable trees.

Desirable trees.—Growing-stock trees of commercial species (a) that have no serious defects in quality that limit present or prospective use for timber products, (b) that are of relatively high vigor, and (c) that contain no pathogens that may result in death or serious deterioration before rotation age.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot sawlog, now or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in the tree is rotten.

Rough trees.—(1) The same as above, except that rough trees do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (2) live trees that are of noncommercial species.

Site-Quality Classes

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood. Classifications are based upon the mean annual growth of growing stock attainable in fully stocked stands at culmination of mean annual growth.

Forest Types

The forest-type classification of each sample plot is based upon the species that make up a plurality of live tree stocking. The many local forest types were combined into the following major forest types.

White-red pine.—Forests in which eastern white pine or red pine, singly or in combination, make up a plurality of the stocking. (Common associates include hemlock, aspen, birch, and maple.)

Virginia-shortleaf pine.—Forests in which Virginia pine, shortleaf pine, or other southern yellow pines, singly or in combination, make up a plurality of the stocking. (Common associates include oak, hickory, and gum.)

Oak-pine.—Forests in which hardwoods (usually upland oaks) make up a plurality of the stocking, but in which pines make up 25 to 50 percent of the stocking. (Common associates include gum, hickory, and yellow-poplar.)

Oak-hickory.—Forests in which upland oaks or hickory, singly or in combination, make up a plurality of the stocking, except where pines make up 25 to 50 percent, in which case the stand would be classified oak-pine. (Common associates include yellow-poplar, elm, maple, and black walnut.)

Oak-gum.—Bottomland forests in which blackgum, sweetgum, or oaks, singly or in combination, make up a plurality of the stocking, except where pines make up 25 to 50 percent in which case the stand would be classified oak-pine. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-cottonwood.—Forests in which elm, ash, or cottonwood, singly or in combination, make up a plurality of the stocking. (Common associates include willow, sycamore, beech, and red maple.)

Maple-beech-birch.—Forests in which sugar maple, beech, or yellow birch, singly or in combination, make up a plurality of the stocking. (Common associates include hemlock, elm, basswood, and white pine.)

Aspen-birch.—Forests in which aspen, paper birch, or gray birch, singly or in combination, make up a plurality of the stocking. (Common associate is maple.)

Class of Timber

Softwoods.—Coniferous trees, generally evergreen, that have needles or scalelike leaves.

Hardwoods.—Dicotyledonous trees that are generally broad-leaved and deciduous.

Sawtimber trees.—Live trees of commercial species that: (a) have these minimum diameters at breast height—softwoods 9.0 inches and hardwoods 11.0 inches; (b) contain at least one 12-foot merchantable sawlog; and (c) meet regional specifications for freedom from defect.

Poletimber trees.—Live trees of commercial species that meet regional specifications of soundness and form, and are at least 5.0 inches d.b.h., but are smaller than sawtimber size.

Saplings.—Live trees of commercial species 1.0 to 5.0 inches in diameter at breast height and of good form and vigor.

Seedlings.—Live trees of commercial species less than 1.0 inch in diameter at breast height that are expected to survive according to regional standards.

Rough and rotten trees.—See definitions under *Tree Classes.*

Timber Volume

Growing-stock volume.—Net volume, in cubic feet, of live growing-stock trees that are 5.0 inches d.b.h. and over from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs.

Standard cord.—A unit of measure for stacked bolts of wood encom-

passing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying an average factor of 80 cubic feet of wood (inside bark) per rough cord.

Sawtimber volume.—Net volume in board feet, International ¼-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Sawlog.—A log that meets minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods. (See specifications under *Log Grade Classification.)*

Sawlog portion.—That part of the bole of sawtimber trees between the stump and the sawlog top (merchantable top).

Sawlog top.—The point on the bole of sawtimber trees above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Upper-stem portion.—That part of the bole of sawtimber trees above the sawlog top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

Log Grades

The standard-lumber log grades for white pine, yellow pines, and hardwoods, and the specifications for hardwood tie-and-timber logs, are given below.

WHITE PINE LOG GRADES
Trial specifications (revised)

Log grade	*Minimum size*		*Defect allowance*		*Maximum weevil injury*	*Allowable knot size (inches on 3 best faces or minimum clearness on 4 faces)*
	Diameter	*Length*[1]	*Sweep or crook*	*Total cull including sweep*		
	Inches 12 & 13	*Feet* 8-16	*Percent* 20	*Percent* 50	*Number* 0	4 faces free of knots ½ inch or larger full length of log.
No. 1 (Select)	14 +	10-16	20	50	0	2 faces free of knots ½ inch or larger full length of log, or 4 faces free of knots ½ inch or larger 50 percent length of log (6 feet minimum length).[2]
No. 2 (Finish)	6 +	8-16	30	50	0	Sound red knots $\leq$[3] D/6 and no longer than 3 inches. Black knots: Butt logs $\leq$ (D/12) and no larger than 1½ inches. Upper logs $\leq$ (D/10) and no larger than 1½ inches or 4 faces free of knots ½ inch or larger 50 percent length of log.
No. 3 (Premium)	6 +	8-16	40	50	8-foot logs: 1 weevil 10-foot + logs: 2 weevils	Sound red knots $\leq$ D/3 and no larger than 5 inches. Black knots $\geq$ D/6 and no larger than 2½ inches.
No. 4 (Standard)	6 +	8-16	50	50	No limit	No limit.

[1] Plus trim.
[2] If the sum of the diameters of sound red knots plus 2 times (sum of the diameters of dead or black knots) in inches is $\leq$ ½ the diameter of the log (in inches).
[3] $\leq$ means equal to or less than.

YELLOW PINE LOG GRADES[1]

Log grade	*Minimum diameter and maximum aggregate knot criteria*		
	With 4 visible faces	*With 3 visible faces*	*With 2 visible faces*
No. 1	D = >17 and 5K = <D	D = >17 and 7K = <D	D = >17 and 10K = <D
No. 2	D = >10 and 2K = <D <5K	D = >10 and 3K = <D <7K	D = >10 and 4K = <D <10K
No. 3	D = >5 and D <2K	D = >5 and D <3K	D = >5 and D <4K
No. 4	D = >5, but not qualified for higher grade after compliance with the following degrade rules: (A) Degrade any log one grade if D equals or is less than 3 times sweep of at least 3 inches. (B) Then degrade any non-grade No. 4 log one grade if massed heart-rot hyphae visible on circumferential log surface suggest that fruiting has occurred or is imminent. (C) Then degrade any grade No. 3 log to Grade No. 4 if bad knots are too dispersed for containment in a 90-degree radial sector extending ¼ of log length.		

[1] From USDA Forest Service, 1953 INTERIM LOG GRADES FOR SOUTHERN PINE, October 1953.

HARDWOOD LUMBER LOGS

Grade factors *		*Specifications*							
		Log grade 1			*Log grade 2*				*Log grade 3*
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Minimum diameter (inches)		13-15[1]	16-19	20+	11[2]	12+			8+
Minimum length (feet)		10+	10+	10+	10+	8-9	10-11	12+	8+
Clear cuttings** on each of the 3 best faces	Minimum length (feet)	7	5	3	3	3	3	3	2
	Maximum number	2	2	2	2	2	2	3	—
	Minimum yield in face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance (percent of gross volume)		15			30				50
Maximum cull and sweep allowance (percent of gross volume)		40 [3]			50 [4]				50

* End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in Forest Prod. Lab. Rpt. D1737.

** A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.

[1] Ash and basswood butts can be 12 inches if otherwise meeting requirements for small No. 1's.

[2] Ten-inch logs of all species can be No. 2 if otherwise meeting requirements for small No. 1's.

[3] Otherwise No. 1 logs with 41 to 50 percent cull can be No. 2.

[4] Otherwise No. 2 logs with 51 to 60 percent cull can be No. 3.

HARDWOOD TIE-AND-TIMBER LOGS

Grade factors		*Specifications*
Position in tree		Butts and uppers
Scaling diameter (inches)		8+
Length, without trim (feet)		8+
Clear cuttings		No requirements. Not graded on cutting basis.
Max. sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound** surface defects permitted		Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.

* Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

** Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

Net Annual Growth and Timber Removals

Average net annual growth of growing stock.—The change (resulting from natural causes) in volume of sound wood in sawtimber and poletimber trees during the period between surveys, divided by the length of the period. (Components of net annual growth of growing stock include the increment in net volume of trees present at the beginning of the period and surviving to its end, plus net volume of trees reaching poletimber size during the period, minus the net volume of trees that died during the period, minus the net volume of trees that became rough or rotten trees during the period.)

Ingrowth of growing stock.—The net cubic-foot volume of trees

now classified as growing stock that were not tallied as such on the initial survey, divided by the length of the period between surveys.

Average annual mortality of growing stock.—The net cubic-foot volume removed from the growing stock through death from natural causes during the period between surveys, divided by the length of the period between surveys.

Average annual growing stock removals.—The net cubic-foot volume of live growing-stock trees harvested or killed in logging, cultural operations like timber-stand improvement, land clearing, or changes in land use during the period between surveys and converted to an annual basis.

Average net annual growth of sawtimber.—The change (resulting from natural causes) in net board-foot volume of sawtimber during the period between surveys, divided by the length of the period between surveys. (Components of net annual growth of sawtimber include the increment in net volume of sawtimber trees present at the beginning of the period and surviving to its end, plus the net volume of trees reaching sawtimber size during the period, minus the net volume of sawtimber trees that died during the period, minus the net volume of sawtimber trees that became rough or rotten during the period.)

Ingrowth of Sawtimber.—The net board-foot volume of trees now classed as sawtimber that were not tallied on the initial survey, divided by the length of the period between surveys.

Average annual mortality of sawtimber.—The net board-foot volume removed from live sawtimber through death from natural causes during the period between surveys, divided by the length of the period between surveys.

Average annual sawtimber removals.—The net board-foot volume of live sawtimber trees harvested or killed in logging, cultural operations like timber-stand improvement, land clearing, or changes in land use during the period between surveys and converted to an annual basis.

FOREST SURVEY METHODS

Hill Country forest area and timber volume estimates were obtained by combining the results of two independent inventories. One was based on the updating of the initial survey (1952). This procedure required the remeasurement of a subsample of the initial inventory ground plots. With the area-change and current volume estimates obtained from the remeasured sample plots, regression techniques were used to update all the initial ground and photo plots to obtain an estimate of current timber volume and forest area.

The second inventory was also based on a large photo-plot sample with a subsample of ground plots. For the second measurement, the most recent aerial photographs of the Hill Country were used. Photo plots were pinpointed on each photograph to provide a uniformly distributed sample of the area. Each photo plot was examined stereoscopically and classified as either forest or nonforest land. Those classified as forest plots were further stratified into cubic-foot-volume-per-acre classes. A subsample of

these photo plots, which was selected to be proportional to the area in a photo class, was measured on the ground. From this, ground measurement estimates of the mean and variance of each photo class were obtained. These means were expanded by the photo strata area to yield an independent estimate of forest area and timber volume.

The final estimates of current forest area and timber volume were developed by combining the two independent inventories. The combination process consisted of weighting each estimate by the reciprocal of its variance and then adding them. The associated sampling error for this new estimate was also obtained. These combined totals were partitioned into the various categories of area and volume (volume by species and d.b.h. class) using the data obtained from the new ground-plot sample.

In addition to estimating current timber volume and forest area, the forest survey of the Hill Country was designed to obtain an estimate of the components of change during the period between the initial and the current inventories. The parameters of interest include area change from forest to nonforest and vice versa, timber growth, timber removals, and timber mortality. All this information was obtained from the remeasured plots. The timber-change parameters were obtained by a tree-by-tree reconciliation of each remeasured plot. Using the reconciliation code for each remeasured tree, estimates of the parameters of change were made by species. The estimates of change were expressed as an annual figure by dividing the total for the period by the number of years between measurements.

Remeasured Phase

The initial forest inventory of the Hill Country consisted of a large photo-plot sample plus a ground measurement of a subsample of these photo plots. The photo plots were stratified according to land use as forest or nonforest. The forest plots were further classified into stand-size classes. Over 1,300 ground plots were measured by field crews during this first inventory. These ground samples were 1/5-acre circular radius plots.

For the remeasurement, a sample (selected randomly within each initial plot class), of 332 of the initial ground plots was revisited. These plots were distributed within the three geographic units as follows:

South-Central Unit	117
Southeastern Unit	106
East-Central Unit	109

The plot center was relocated for each remeasured plot. On those plots that were forested, all the trees on the 1/5-acre were tallied. The new tally was reconciled with the initial tally to account for every tree at both occasions.

New Ground Phase

The source of the new, independent estimates of volume and forest area was a new photo stratification with a subsample of ground measurements. The photo sample of the Hill Country consisted of 32,900 photo points on 1964-65 aerial photographs. A subset of 2,022 of these photo plots was located on the ground. Land use was verified and tree-measure-

ment data were recorded for the forest plots. Unlike the initial inventory, where fixed-radius 1/5-acre plots were tallied, the new ground plots consisted of a cluster of 10 prism points systematically covering approximately 1 acre. At each point trees were selected for tally, using a prism with a basal area factor of 37.5. Area attribute data were also tallied at each of the 10 points.

The 2,022 ground plots in the Hill Country were distributed within geographic strata as follows:

South-Central Unit	760
Southeastern Unit	495
East-Central Unit	767

County Data

In recent years users of forest-survey data have shown a need for county information. To provide such information within the framework of the survey design, county tables have been developed, based on a survey unit partitioning technique. First, the survey unit means and variances for the various photo-plot strata were applied to the photo-plot data for each county within the survey unit. This yielded an estimate of total volume or total commercial forest land area for each county. Next the data from the new ground plots were used to partition the county totals into their various components. For example, if a table of cubic-foot volume by species was to be made for a county, the estimate of total cubic-foot volume for that county was partitioned into species totals according to the species proportion for all new forest-survey ground plots within the unit.

Wayne National Forest

A separate inventory of the approximately 120,000 acres of forest land in the Wayne National Forest was conducted by the inventory staff of the National Forest Administration, Region 9. This inventory was designed to estimate current volume and commercial forest area, using the photo stratification of the most recent aerial photographs. The photo stratification was made only on the basis of forest-nonforest area. No attempt was made to estimate forest volume classes. A subsample of the photo plots was located and measured on the ground to estimate volume and area means and variances. These means were expanded by the photo stratification to obtain an estimate of total volume and area. The totals were partitioned, based on the measurement data from the ground sample plots.

Comparisons Between Inventories

A comparison of the 1967 and 1952 forest-survey estimates of volume, growth, removals, and mortality was made for the Hill Country of Ohio, using computer program TRAS (Timber Resource Analysis System). The estimates were found to be similar. But, because the survey unit boundaries were different for the first survey, the 1952 statistics for the South-Central Unit and for the Hill Country had to be adjusted to include data for Brown and Clermont Counties before they could be compared with 1967 statistics. Such adjustments have been made, where needed, in this report.

No adjustments are needed to compare trends in the Southeastern or East-Central Units. The procedure for obtaining county data (see *Forest Survey Methods)* does not make possible comparisons of inventory trends for counties.

RELIABILITY OF THE ESTIMATES

The forest-area and timber-volume data presented in this report are based on a carefully designed sample of forest conditions throughout the Hill Country. However, since neither every acre nor every tree in the region was measured, the figures in this report are estimates. A measure of the reliability of these estimates is given by a sampling error. Each estimate in this report had a computed sampling error. Included with the statistical tables are the corresponding sampling errors for row totals and column totals.

Briefly, here is how the sampling error indicates reliability. Our report of the total growing-stock volume in southeastern Ohio, 2,887 million cubic feet, has an associated sampling error of 1 percent (28.9 million cubic feet). This means that our best estimate of the total growing-stock volume in 1967 is 2,887 million cubic feet. If there are no errors in procedure, the odds are 2 to 1 that, if we repeated the resurvey in the same way, the new estimate of growing-stock volume would be between 2,858 million and 2,916 million cubic feet (2,887 $\pm$ 28.9). Similarly, the odds are 19 to 1 that it would be within $\pm$ 58 million cubic feet of the present estimate, and 300 to 1 that it would be within $\pm$ 87 million cubic feet.

The computed sampling error is not a complete measure of reliability; there are other sources of error that this term does not include. There could be imperfections in our volume tables and equations and errors in field measurement. Procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in the statistical tables are:

	Sampling error (percent)
Commercial forest area	
4.4 million acres	1.3
Growing-stock volume	
2.9 billion cubic feet	1.3
Sawtimber volume	
9.8 billion board feet	1.7
Average net annual growth of growing stock	
103.8 million cubic feet	8.9
Average annual removals of growing stock	
41.6 million cubic feet	14.8

COMMON COMMERCIAL TREE SPECIES OF OHIO[5]

Softwoods

Common Name	Botanical Name
Eastern white pine	*Pinus strobus*
Red pine (Norway)	*P. resinosa*
Virginia pine	*P. virginiana*
Shortleaf pine	*P. echinata*
Pitch pine	*P. rigida*
Other softwoods:	
Eastern hemlock	*Tsuga canadensis*
Eastern redcedar	*Juniperus virginiana*
Northern white-cedar	*Thuja occidentalis*

Hardwoods

Select white oaks:	
White oak	*Quercus alba*
Swamp white oak	*Q. bicolor*
Swamp chestnut oak	*Q. michauxii*
Chinkapin oak	*Q. muehlenbergii*
Bur oak	*Q. macrocarpa*
Other white oaks:	
Chestnut oak	*Q. prinus*
Post oak	*Q. stellata var. stellata*
Select red oaks:	
Northern red oak	*Q. rubra*
Shumard oak	*Q. shumardii*
Other red oaks:	
Black oak	*Q. velutina*
Pin oak	*Q. palustris*
Scarlet oak	*Q. coccinea*
Shingle oak	*Q. imbricaria*
Southern red oak	*Q. falcata var falcata*
Hickory	*Carya* spp.
Hard maple:	
Sugar maple	*Acer saccharum*
Black maple	*A. nigrum*
Soft maple:	
Red maple	*A. rubrum*
Silver maple	*A. saccharinum*
Beech	*Fagus grandifolia*
White ash	*Fraxinus americana*

[5] Little, Elbert L., Jr. CHECKLIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U. S. Dep. Agr., Agr. Handbook 41, 472 pp. 1953.

Other ash:	
Black ash	*F. nigra*
Green ash	*F. pennsylvanica*
Blue ash	*F. quadrangulata*
Quaking aspen	*Populus tremuloides*
Bigtooth aspen	*P. grandidentata*
Eastern cottonwood	*P. deltoides*
Swamp cottonwood	*P. heterophylla*
Basswood (American linden)	*Tilia americana*
White basswood (beetree linden)	*T. heterophylla*
Yellow-poplar	*Liriodendron tulipifera*
Black walnut	*Juglans nigra*
Black cherry	*Prunus serotina*
Sycamore (buttonwood)	*Platanus occidentalis*
Black locust	*Robinia pseudoacacia*
Elm	*Ulmus* spp.
Sassafras[6]	*Sassafras albidum*
Other hardwoods:	
Butternut	*Juglans cinerea*
American chestnut	*Castanea dentata*
Black willow	*Salix nigra*
Buckeye	*Aesculus* spp.
Common persimmon	*Diospyros virginiana*
Cucumbertree	*Magnolia acuminata*
Flowering dogwood (dogwood)	*Cornus florida*
Hackberry	*Celtis occidentalis*
Honey locust	*Gleditsia triacanthos*
Kentucky coffeetree	*Gymnocladus dioicus*
River birch (red)	*Betula nigra*
Sweet birch (black)	*B. lenta*
Sweetgum	*Liquidamber styraciflua*
Blackgum (black tupelo)	*Nyssa sylvatica*

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Table 1.—*Area in the Hill Country of Ohio, by land classes and counties, 1967*

County	Total land area[1]	Nonforest land area	Forest land area[2]			
			Non-commercial	Commercial		Sampling error
	Thousand acres	*Thousand acres*	*Thousand acres*	*Thousand acres*	*Percent*	*Percent*
SOUTH-CENTRAL UNIT						
Adams	375.9	188.8	0.2	186.9	50	6
Brown	313.9	237.1	—	76.8	24	12
Clermont	293.3	202.3	.8	90.2	31	9
Gallia	301.4	142.3	—	159.1	53	7
Highland	351.4	267.2	2.2	82.0	23	12
Jackson	267.9	126.3	.3	141.3	53	8
Lawrence	291.5	83.4	—	208.1	71	6
Pike	283.6	114.2	.9	168.5	59	6
Ross	439.6	269.3	1.0	169.3	39	7
Scioto	389.2	129.5	.2	259.5	67	5
Unit total	3,307.7	1,760.4	5.6	1,541.7	47	2
SOUTHEASTERN UNIT						
Athens	322.6	104.8	2.5	215.3	67	7
Hocking	269.4	71.0	1.6	196.8	73	6
Meigs	278.7	110.6	.6	167.5	60	7
Morgan	268.5	151.2	2.4	114.9	43	10
Perry	262.1	129.2	—	132.9	51	10
Vinton	262.7	66.8	1.7	194.2	74	6
Washington	410.2	159.1	—	251.1	61	6
Unit total	2,074.2	792.7	8.8	1,272.7	61	2
EAST-CENTRAL UNIT						
Belmont	342.0	183.7	1.6	156.7	46	9
Carroll	249.9	136.1	.7	113.1	45	11
Coshocton	359.6	211.2	.2	148.2	41	10
Guernsey	337.7	182.3	13.2	142.2	42	10
Harrison	256.6	117.9	1.3	137.4	54	11
Holmes	271.1	177.6	—	93.5	34	13
Jefferson	262.8	114.6	.9	147.3	56	9
Monroe	291.8	108.0	—	183.8	63	8
Muskingum	427.0	251.4	1.5	174.1	41	9
Noble	255.0	139.3	.9	114.8	45	12
Tuscarawas	364.2	207.9	.5	155.8	43	10
Unit total	3,417.7	1,830.0	20.8	1,566.9	46	3
Region total	8,799.6	4,383.1	35.2	4,381.3	50	1

[1] Land area from U. S. Bureau of the Census, Land and Water Areas of Ohio: 1960.
[2] There is no unproductive forest land in this region.

Table 2.—*Area of commercial forest land in the Hill Country of Ohio, by ownership classes and counties, 1967*

[In thousands of acres.]

County	Public-owned[1]		Private-owned		Total
	National forest	Other public[2]	Farmer-owned	Other private	
Adams	—	16.3	97.6	73.0	186.9
Athens	8.2	3.5	67.9	135.7	215.3
Belmont	—	2.6	50.3	103.8	156.7
Brown	—	.8	40.6	35.4	76.8
Carroll	—	3.1	46.9	63.1	113.1
Clermont	—	—	30.7	59.5	90.2
Coshocton	—	5.2	62.0	81.0	148.2
Gallia	4.5	.3	71.4	82.9	159.1
Guernsey	—	.8	61.6	79.8	142.2
Harrison	—	7.8	33.0	96.6	137.4
Highland	—	.9	42.0	39.1	82.0
Hocking	18.5	9.7	76.0	92.6	196.8
Holmes	—	—	61.1	32.4	93.5
Jackson	.4	6.2	36.2	98.5	141.3
Jefferson	—	3.6	44.2	99.5	147.3
Lawrence	38.9	1.8	57.7	109.7	208.1
Meigs	—	2.3	94.9	70.3	167.5
Monroe	4.3	1.1	72.0	106.4	183.8
Morgan	2.3	2.2	65.5	44.9	114.9
Muskingum	—	5.3	67.1	101.7	174.1
Noble	—	1.3	35.4	78.1	114.8
Perry	16.4	2.4	39.2	74.9	132.9
Pike	—	10.3	62.0	96.2	168.5
Ross	—	22.9	77.4	69.0	169.3
Scioto	5.2	54.4	54.9	145.0	259.5
Tuscarawas	—	1.4	54.0	100.4	155.8
Vinton	2.0	25.2	59.8	107.2	194.2
Washington	11.6	.2	111.6	127.7	251.1
All counties	112.3	191.6	1,673.0	2,404.4	4,381.3

[1] From ownership records.

[2] Includes 19,900 acres in the Muskingum Watershed Conservatory District within this region.

Table 3.—*Area of commercial forest land in the Hill Country of Ohio, by stand-size classes and counties, 1967*

[In thousands of acres]

County	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	Total
Adams	52.8	27.3	104.7	2.1	186.9
Athens	68.2	25.6	114.4	7.1	215.3
Belmont	39.8	18.9	93.0	5.0	156.7
Brown	16.4	10.0	49.1	1.3	76.8
Carroll	24.7	12.1	73.2	3.1	113.1
Clermont	35.1	12.4	41.9	.8	90.2
Coshocton	37.0	16.4	88.9	5.9	148.2
Gallia	39.2	23.9	93.3	2.7	159.1
Guernsey	32.6	15.7	88.2	5.7	142.2
Harrison	19.6	12.0	99.3	6.5	137.4
Highland	23.1	11.2	46.5	1.2	82.0
Hocking	63.4	25.2	100.7	7.5	196.8
Holmes	28.6	11.4	50.1	3.4	93.5
Jackson	45.8	19.0	74.6	1.9	141.3
Jefferson	39.2	18.6	85.4	4.1	147.3
Lawrence	72.4	29.5	99.1	7.1	208.1
Meigs	56.9	19.8	86.3	4.5	167.5
Monroe	50.6	24.8	104.2	4.2	183.8
Morgan	27.1	12.8	71.6	3.4	114.9
Muskingum	42.5	21.8	104.6	5.2	174.1
Noble	18.7	11.0	80.3	4.8	114.8
Perry	37.5	14.4	75.0	6.0	132.9
Pike	59.2	26.1	81.9	1.3	168.5
Ross	61.9	24.7	81.4	1.3	169.3
Scioto	88.8	41.2	126.4	3.1	259.5
Tuscarawas	34.0	16.8	99.6	5.4	155.8
Vinton	68.7	24.9	95.8	4.8	194.2
Washington	75.4	30.9	136.9	7.9	251.1
All counties	1,259.2	558.4	2,446.4	117.3	4,381.3

Table 4.—*Area of commercial forest land in the Hill Country of Ohio, by stocking-percent classes of acceptable trees and counties, 1967*

[In thousands of acres]

County	Acceptable-tree stocking class [1]			Total
	Over 70 percent	40 to 70 percent	Under 40 percent	
Adams	117.5	53.8	15.6	186.9
Athens	121.3	64.0	30.0	215.3
Belmont	63.8	65.3	27.6	156.7
Brown	43.2	24.5	9.1	76.8
Carroll	44.6	49.0	19.5	113.1
Clermont	61.7	22.9	5.6	90.2
Coshocton	59.7	60.3	28.2	148.2
Gallia	95.2	48.1	15.8	159.1
Guernsey	56.0	58.6	27.6	142.2
Harrison	47.5	59.1	30.8	137.4
Highland	50.1	24.0	7.9	82.0
Hocking	110.0	61.2	25.6	196.8
Holmes	41.6	36.4	15.5	93.5
Jackson	91.7	37.2	12.4	141.3
Jefferson	60.6	61.3	25.4	147.3
Lawrence	118.8	64.2	25.1	208.1
Meigs	99.5	47.3	20.7	167.5
Monroe	75.8	77.5	30.5	183.8
Morgan	60.4	37.0	17.5	114.9
Muskingum	71.5	72.8	29.8	174.1
Noble	40.7	50.0	24.1	114.8
Perry	65.5	42.3	25.1	132.9
Pike	114.2	44.8	9.5	168.5
Ross	114.5	44.9	9.9	169.3
Scioto	173.8	69.6	16.1	259.5
Tuscarawas	60.6	66.2	29.0	155.8
Vinton	119.5	56.0	18.7	194.2
Washington	141.3	77.3	32.5	251.1
All counties	2,320.6	1,475.6	585.1	4,381.3

[1] Acceptable trees make up about 94 percent of the number of growing-stock trees. Desirable trees were not included in this table.

Table 5.—*Area of commercial forest land in the Hill Country of Ohio, by forest types and counties, 1967*

[In thousands of acres]

County	White-red pine[1]	Virginia-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Total
Adams	1.2	14.1	13.9	108.0	1.2	26.3	21.8	0.4	186.9
Athens	.8	10.2	13.4	127.8	2.5	25.3	34.3	1.0	215.3
Belmont	3.5	1.3	10.8	60.0	.4	45.7	31.1	3.9	156.7
Brown	.5	.6	6.4	47.9	.7	10.8	9.7	.2	76.8
Carroll	2.2	.7	8.3	45.3	.1	33.0	20.1	3.4	113.1
Clermont	.3	.2	6.1	61.3	.5	10.0	11.7	.1	90.2
Coshocton	3.8	1.3	11.3	55.3	.5	43.0	30.0	3.0	148.2
Gallia	1.0	15.0	12.0	89.2	.9	22.4	17.8	.8	159.1
Guernsey	3.8	1.0	9.7	53.0	.6	42.1	28.8	3.2	142.2
Harrison	4.8	.5	11.5	49.5	.8	41.0	25.9	3.4	137.4
Highland	.4	5.9	6.5	47.4	.7	10.4	10.5	.2	82.0
Hocking	1.3	9.5	10.5	122.3	1.8	21.5	28.3	1.6	196.8
Holmes	1.7	.8	6.3	36.8	.1	27.3	18.6	1.9	93.5
Jackson	.6	12.3	11.1	82.2	1.3	17.0	16.6	.2	141.3
Jefferson	3.1	.9	9.7	57.3	.3	42.6	29.7	3.7	147.3
Lawrence	2.3	23.9	13.0	119.9	.7	25.3	20.4	2.6	208.1
Meigs	.4	6.8	9.6	100.5	1.7	19.5	28.6	.4	167.5
Monroe	3.7	1.8	11.1	74.4	.2	52.1	35.3	5.2	183.8
Morgan	.6	5.0	8.2	66.3	1.5	15.7	17.0	.6	114.9
Muskingum	3.6	1.6	11.9	67.9	.3	51.4	32.8	4.6	174.1
Noble	3.5	.8	9.7	41.5	.6	34.0	21.7	3.0	114.8
Perry	1.1	8.1	9.3	75.6	1.6	17.5	18.4	1.3	132.9
Pike	.6	9.8	12.0	103.6	.8	21.1	20.2	.4	168.5
Ross	.6	10.0	11.4	104.1	.7	20.5	21.7	.3	169.3
Scioto	1.2	14.4	17.7	161.1	1.0	33.1	30.0	1.0	259.5
Tuscarawas	3.8	1.0	12.6	59.2	.4	45.5	29.3	4.0	155.8
Vinton	.6	6.7	9.2	122.7	1.6	20.4	32.4	.6	194.2
Washington	1.3	10.7	14.5	153.0	2.5	29.5	38.2	1.4	251.1
All counties	52.3	174.9	297.7	2,293.1	26.0	804.0	680.9	52.4	4,381.3

[1] Includes 9,200 acres in spruce plantations.

Table 6.—*Net volume of growing stock on commercial forest land in the Hill Country of Ohio, by tree-size classes and counties, 1967*

[In millions of cubic feet]

County	Sawtimber trees	Poletimber trees	Total growing stock
Adams	79.6	50.9	130.5
Athens	93.8	50.3	144.1
Belmont	56.4	35.4	91.8
Brown	25.7	18.5	44.2
Carroll	38.0	25.4	63.4
Clermont	48.0	26.3	74.3
Coshocton	52.4	32.6	85.0
Gallia	62.6	42.5	105.1
Guernsey	47.7	30.4	78.1
Harrison	35.9	25.7	61.6
Highland	33.7	21.3	55.0
Hocking	87.5	48.7	136.2
Holmes	37.8	22.6	60.4
Jackson	65.4	38.5	103.9
Jefferson	54.3	34.0	88.3
Lawrence	102.8	59.4	162.2
Meigs	76.4	39.8	116.2
Monroe	70.0	44.1	114.1
Morgan	40.5	24.3	64.8
Muskingum	62.2	40.0	102.2
Noble	32.6	22.4	55.0
Perry	52.3	29.2	81.5
Pike	84.5	49.7	134.2
Ross	86.7	49.6	136.3
Scioto	129.6	77.1	206.7
Tuscarawas	51.6	33.7	85.3
Vinton	92.5	49.0	141.5
Washington	105.5	59.4	164.9
All counties	1,806.0	1,080.8	2,886.8

Table 7.—*Net volume of growing stock on commercial forest land in the Hill Country of Ohio, by stand-size classes and counties, 1967*

[In millions of cubic feet]

County	Sawtimber stands	Poletimber stands	Other stands [1]	Total	Sampling error [2]
					Percent
Adams	66.5	26.0	38.0	130.5	8
Athens	84.1	21.8	38.2	144.1	9
Belmont	47.3	16.8	27.7	91.8	11
Brown	19.3	9.5	15.4	44.2	15
Carroll	30.4	11.7	21.3	63.4	15
Clermont	45.3	12.9	16.1	74.3	11
Coshocton	43.8	15.2	26.0	85.0	12
Gallia	48.9	22.2	34.0	105.1	11
Guernsey	39.7	14.1	24.3	78.1	13
Harrison	25.8	11.1	24.7	61.6	16
Highland	28.1	10.9	16.0	55.0	14
Hocking	77.0	21.4	37.8	136.2	9
Holmes	34.1	11.0	15.3	60.4	15
Jackson	59.0	19.0	25.9	103.9	10
Jefferson	46.0	16.5	25.8	88.3	12
Lawrence	94.6	27.1	40.5	162.2	9
Meigs	70.6	16.9	28.7	116.2	9
Monroe	59.3	21.7	33.1	114.1	12
Morgan	31.8	10.8	22.2	64.8	12
Muskingum	50.8	19.6	31.8	102.2	11
Noble	23.8	9.9	21.3	55.0	16
Perry	46.1	11.9	23.5	81.5	13
Pike	75.2	25.2	33.8	134.2	9
Ross	79.2	24.9	32.2	136.3	9
Scioto	113.3	39.9	53.5	206.7	7
Tuscarawas	41.2	15.5	28.6	85.3	13
Vinton	84.4	21.2	35.9	141.5	8
Washington	90.9	26.1	47.9	164.9	8
All counties	1,556.5	510.8	819.5	2,886.8	1

[1] Volume is mostly in sapling-seedling stands. Volume in nonstocked areas amounts to 9.7 million cubic feet (1 percent of this class).

[2] Sampling error for total.

Table 8.—*Net volume of sawtimber on commercial forest land in the Hill Country of Ohio, by stand-size classes and counties, 1967*

[In millions of board feet]

County	Sawtimber stands	Poletimber stands	Other stands [1]	Total	Sampling error [2]
					Percent
Adams	260.0	57.4	105.7	423.1	10
Athens	344.2	46.7	114.9	505.8	11
Belmont	197.4	36.2	84.2	317.8	14
Brown	76.6	20.9	40.8	138.3	20
Carroll	124.9	24.6	63.6	213.1	19
Clermont	177.8	28.5	47.9	254.2	13
Coshocton	185.7	32.6	77.1	295.4	15
Gallia	192.6	48.9	92.5	334.0	14
Guernsey	165.9	29.9	72.9	268.7	10
Harrison	106.6	22.5	73.0	202.1	20
Highland	110.9	24.0	44.7	179.6	18
Hocking	310.9	45.6	113.8	470.3	12
Holmes	141.3	23.8	47.8	212.9	18
Jackson	231.3	42.1	73.8	347.2	12
Jefferson	191.7	35.7	78.5	305.9	15
Lawrence	372.8	58.7	113.2	544.7	11
Meigs	287.2	36.5	86.7	410.4	12
Monroe	246.2	47.3	99.9	393.4	14
Morgan	129.8	23.9	67.0	220.7	15
Muskingum	211.1	42.5	96.4	350.0	9
Noble	98.9	20.3	64.2	183.4	21
Perry	187.4	25.3	69.6	282.3	16
Pike	293.8	55.8	98.3	447.9	11
Ross	310.8	55.2	93.2	459.2	12
Scioto	444.2	87.7	153.8	685.7	9
Tuscarawas	170.5	32.9	87.0	290.4	16
Vinton	340.9	46.1	108.2	495.2	10
Washington	367.4	56.5	144.3	568.2	10
All counties	6,278.8	1,108.1	2,413.0	9,799.9	2

[1] Volume is mostly in sapling-seedling stands. Volume in nonstocked areas amounts to 29.4 million board feet (1 percent of this class).

[2] Sampling error for total.

Table 9.—*Net volume of growing stock on commercial forest land in the Hill Country of Ohio, by species and counties, 1967*

[In millions of cubic feet]

Species	Adams	Athens	Belmont	Brown	Carroll	Clermont	Coshocton
White pine [1]	0.1	1.0	1.8	—	1.3	—	1.7
Yellow pine [2]	6.1	3.3	.4	—	.2	—	.3
Other softwoods [3]	.4	.3	.7	0.2	.4	0.1	.6
Total softwoods	6.6	4.6	2.9	0.2	1.9	0.1	2.6
Select white oaks	21.7	26.6	10.1	6.8	7.2	11.9	9.6
Select red oaks	7.8	11.4	6.3	2.8	4.3	5.0	5.9
Chestnut oak [4]	16.0	11.7	2.2	4.5	1.5	11.3	1.9
Other red oaks	16.0	20.9	8.6	7.5	6.3	13.4	8.0
Hickory	15.7	14.7	8.3	5.2	6.0	8.3	7.8
Sugar maple	6.3	6.4	3.7	1.9	2.6	3.2	3.5
Soft maples	3.3	3.3	4.4	1.3	3.2	1.8	4.2
Beech	1.7	4.3	4.0	.5	2.6	1.2	3.8
White ash [5]	6.6	4.8	4.4	2.1	2.8	3.8	3.8
Aspen [6]	.7	1.4	2.1	.3	1.6	.3	1.8
Basswood	.7	.9	.6	.3	.5	.5	.6
Yellow-poplar	8.2	14.6	9.0	3.0	5.8	4.6	8.7
Black walnut	3.0	3.2	2.7	1.3	2.1	1.2	2.4
Black cherry	1.7	1.7	5.5	.7	3.7	.7	4.9
Sycamore	3.2	2.8	1.2	1.4	.6	1.4	.9
Black locust	1.4	.9	2.3	.7	1.5	.6	2.0
Elm	3.3	5.2	10.6	1.2	7.1	1.5	9.9
Sassafras	1.9	.6	.7	.8	.5	.9	.7
Other hardwoods	4.7	4.1	2.2	1.7	1.6	2.6	2.0
Total hardwoods	123.9	139.5	88.9	44.0	61.5	74.2	82.4
All species	130.5	144.1	91.8	44.2	63.4	74.3	85.0

Species	Gallia	Guernsey	Harrison	Highland	Hocking	Holmes	Jackson
White pine [1]	0.1	1.7	1.6	—	1.1	0.9	0.1
Yellow pines [2]	6.5	.3	.3	2.4	3.7	.3	5.9
Other softwoods [3]	.3	.6	.4	.1	.2	.4	.2
Total softwoods	6.9	2.6	2.3	2.5	5.0	1.6	6.2
Select white oaks	17.6	8.5	6.3	8.8	24.8	7.2	16.8
Select red oaks	6.3	5.3	3.8	3.5	10.5	4.4	6.7
Chestnut oak [4]	11.7	1.8	1.4	6.8	11.9	1.4	14.5
Other red oaks	11.4	7.4	6.1	7.0	19.4	5.7	12.3
Hickory	12.7	7.1	5.6	6.4	14.2	5.7	11.9
Sugar maple	4.5	3.1	2.2	2.3	5.7	2.7	4.7
Soft maples	2.6	3.7	2.7	1.5	3.3	3.2	2.5

CONTINUED

Table 9—*Continued*

Species	Gallia	Guernsey	Harrison	Highland	Hocking	Holmes	Jackson
Beech	1.3	3.4	2.1	.7	3.5	2.9	1.5
White ash [5]	5.0	3.7	2.8	2.7	4.6	2.7	5.4
Aspen [6]	.7	1.8	1.6	.3	1.7	1.2	.4
Basswood	.6	.5	.4	.3	.8	.6	.6
Yellow-poplar	7.2	7.7	7.1	3.7	14.3	5.2	6.5
Black walnut	2.5	2.3	2.1	1.3	2.6	1.6	2.2
Black cherry	1.5	4.6	3.5	.8	1.6	3.5	1.1
Sycamore	2.7	.9	.6	1.4	2.5	.6	2.3
Black locust	1.3	2.0	1.6	.7	.7	1.2	1.0
Elm	2.9	9.2	7.3	1.4	4.6	7.1	2.4
Sassafras	1.8	.6	.5	.9	.6	.5	1.3
Other hardwoods	3.9	1.9	1.6	2.0	3.9	1.4	3.6
Total hardwoods	98.2	75.5	59.3	52.5	131.2	58.8	97.7
All species	105.1	78.1	61.6	55.0	136.2	60.4	103.9

Species	Jefferson	Lawrence	Meigs	Monroe	Morgan	Muskingum	Noble
White pine [1]	1.8	0.4	0.7	2.3	0.7	2.1	1.3
Yellow pines [2]	.5	10.4	2.1	.9	1.5	.5	.3
Other softwoods [3]	.5	.3	.2	.6	.2	.6	.4
Total softwoods	2.8	11.1	3.0	3.8	2.4	3.2	2.0
Select white oaks	9.8	27.9	21.7	13.0	10.8	11.3	5.6
Select red oaks	6.1	9.8	9.2	7.9	4.8	6.9	3.4
Chestnut oak [4]	2.1	21.3	10.4	3.1	4.7	2.4	1.3
Other red oaks	8.4	21.3	16.7	10.9	8.5	9.6	5.2
Hickory	8.0	18.8	11.8	10.3	6.7	9.2	4.9
Sugar maple	3.6	6.3	5.4	4.6	2.8	4.2	2.0
Soft maples	4.2	3.6	2.7	5.3	1.6	4.8	2.4
Beech	3.9	2.3	3.6	4.8	1.6	4.3	2.0
White ash [5]	4.3	7.1	3.7	5.5	2.5	4.9	2.6
Aspen [6]	2.0	1.2	1.1	2.6	1.0	2.3	1.4
Basswood	.5	.9	.7	.6	.4	.8	.3
Yellow-poplar	8.7	11.9	11.1	11.2	6.9	10.0	6.4
Black walnut	2.5	2.7	2.4	3.4	2.3	3.3	1.9
Black cherry	5.3	1.7	1.4	6.6	.8	6.1	3.2
Sycamore	1.0	3.0	2.4	1.3	1.7	1.0	.6
Black locust	2.3	1.3	.9	3.0	.5	2.8	1.5
Elm	10.0	3.4	4.3	12.5	2.6	11.8	6.5
Sassafras	.7	1.8	.6	1.0	.3	.8	.4
Other hardwoods	2.1	4.8	3.1	2.7	1.9	2.5	1.4
Total hardwoods	85.5	151.1	113.2	110.3	62.4	99.0	53.0
All species	88.3	162.2	116.2	114.1	64.8	102.2	55.0

CONTINUED

Table 9—*Continued*

Species	Perry	Pike	Ross	Scioto	Tuscarawas	Vinton	Washington
White pine [1]	0.8	0.1	0.1	0.2	1.8	0.8	1.2
Yellow pines [2]	2.5	5.4	5.4	8.2	.4	2.6	3.9
Other softwoods [3]	.2	.3	.4	.4	.5	.2	.4
Total softwoods	3.5	5.8	5.9	8.8	2.7	3.6	5.5
Select white oaks	14.4	23.1	22.2	35.5	9.3	26.3	29.5
Select red oaks	6.0	8.1	9.0	13.0	5.7	11.0	12.5
Chestnut oak [4]	6.8	18.2	19.6	27.3	1.9	13.1	14.2
Other red oaks	12.0	17.2	18.6	27.3	8.1	20.3	22.9
Hickory	8.3	16.2	15.6	24.7	7.8	14.8	17.4
Sugar maple	3.1	6.7	6.2	9.6	3.4	6.6	7.2
Soft maples	1.8	3.4	3.4	5.2	4.0	3.4	4.0
Beech	2.1	1.8	1.9	2.9	3.5	4.1	4.4
White ash [5]	2.7	7.0	7.0	10.4	3.9	4.5	5.8
Aspen [6]	1.1	.6	.6	.8	2.0	1.3	2.0
Basswood	.6	.7	.9	1.0	.6	.8	.9
Yellow-poplar	8.5	7.9	8.5	13.2	9.1	13.8	17.2
Black walnut	2.1	2.5	2.3	3.6	2.7	2.5	3.7
Black cherry	.9	1.5	1.4	2.3	5.0	1.7	2.0
Sycamore	1.7	2.7	2.8	4.0	.9	2.7	3.4
Black locust	.4	1.2	1.2	1.9	2.1	1.0	1.0
Elm	2.9	3.1	2.9	5.0	9.8	5.3	6.1
Sassafras	.4	1.9	1.6	3.0	.7	.8	.8
Other hardwoods	2.2	4.6	4.7	7.2	2.1	3.9	4.4
Total hardwoods	78.0	128.4	130.4	197.9	82.6	137.9	159.4
All species	81.5	134.2	136.3	206.7	85.3	141.5	164.9

[1] Includes a small amount of red pine.
[2] Includes Virginia, shortleaf, and pitch pine.
[3] Includes hemlock and eastern redcedar.
[4] Includes other white oaks.
[5] Includes other ash.
[6] Includes cottonwood.

Table 10.—*Net volume of sawtimber on commercial forest land in the Hill Country of Ohio, by species and counties, 1967*

[In millions of board feet]

Species	Adams	Athens	Belmont	Brown	Carroll	Clermont	Coshocton
White pine[1]	—	1.8	4.4	—	2.5	—	3.5
Yellow pines[2]	20.9	11.7	.1	—	.1	—	.1
Other softwoods[3]	1.4	.2	2.9	0.7	2.0	0.5	2.8
Total softwoods	22.3	13.7	7.4	0.7	4.6	0.5	6.4
Select white oaks	78.4	99.7	39.9	24.3	27.5	44.2	37.7
Select red oaks	30.6	46.8	25.5	10.6	16.1	21.6	23.6
Chestnut oak[4]	51.4	38.9	8.6	13.9	6.1	36.2	7.5
Other red oaks	60.3	89.4	34.4	26.0	24.9	52.6	32.3
Hickory	39.1	35.2	26.4	12.4	18.6	20.9	24.2
Sugar maple	17.1	19.6	12.6	4.9	7.4	9.3	11.4
Soft maples	10.1	8.1	13.8	4.5	9.6	5.6	13.2
Beech	9.1	22.8	22.9	2.7	14.0	6.4	21.7
White ash[5]	19.4	13.6	14.8	5.9	9.3	11.8	12.8
Aspen[6]	1.9	2.4	3.9	.7	3.1	.8	3.7
Basswood	2.5	3.4	3.1	.9	2.0	2.0	2.9
Yellow-poplar	34.1	57.2	37.6	12.4	23.7	19.7	36.9
Black walnut	8.3	11.6	7.1	3.6	5.5	3.2	6.5
Black cherry	4.3	4.7	13.2	2.1	8.9	1.9	12.1
Sycamore	12.5	10.6	4.9	4.9	3.0	5.6	4.3
Black locust	1.1	1.9	3.3	.4	2.2	.4	2.6
Elm	7.1	13.6	30.2	2.4	20.5	3.2	28.0
Sassafras	1.7	.8	.5	.6	.3	.7	.6
Other hardwoods	11.8	11.8	7.7	4.4	5.8	7.6	7.0
Total hardwoods	400.8	492.1	310.4	137.6	208.5	253.7	289.0
All species	423.1	505.8	317.8	138.3	213.1	254.2	295.4

Species	Gallia	Guernsey	Harrison	Highland	Hocking	Holmes	Jackson
White pine[1]	—	3.5	2.4	—	1.8	2.4	—
Yellow pines[2]	21.5	.1	.1	8.2	13.1	.1	20.8
Other softwoods[3]	1.1	2.6	1.9	.5	.2	2.0	.9
Total softwoods	22.6	6.2	4.4	8.7	15.1	4.5	21.7
Select white oaks	61.6	33.7	24.4	32.0	92.2	28.2	62.2
Select red oaks	24.9	21.5	14.8	14.5	42.9	17.5	27.2
Chestnut oak[4]	35.9	7.3	6.1	21.1	39.1	5.0	46.9
Other red oaks	43.1	29.3	23.0	26.4	81.4	23.6	49.3
Hickory	31.0	22.4	17.3	16.0	33.7	17.6	30.2
Sugar maple	12.3	10.6	6.7	6.5	17.6	8.5	13.4

CONTINUED

Table 10—*Continued*

Species	Gallia	Guernsey	Harrison	Highland	Hocking	Holmes	Jackson
Soft maples	8.1	11.8	8.5	5.1	7.6	10.0	7.4
Beech	6.8	19.3	11.9	4.0	18.4	16.6	8.2
White ash [5]	14.4	12.3	8.9	8.0	12.3	9.2	16.2
Aspen [6]	1.3	3.4	2.8	.5	2.3	2.6	1.3
Basswood	2.0	2.7	1.7	1.2	3.0	2.7	2.4
Yellow-poplar	29.8	31.5	28.6	15.2	56.7	22.3	26.8
Black walnut	6.9	5.9	4.7	3.4	9.5	4.8	5.9
Black cherry	3.8	11.0	7.6	2.2	4.4	9.3	2.8
Sycamore	10.4	4.1	2.9	5.0	9.8	3.0	8.8
Black locust	1.2	2.7	2.1	.5	1.5	1.8	.7
Elm	6.1	26.0	20.0	2.9	11.2	20.2	5.0
Sassafras	1.5	.5	.4	.7	1.0	.4	1.1
Other hardwoods	10.3	6.5	5.3	5.7	10.6	5.1	9.7
Total hardwoods	311.4	262.5	197.7	170.9	455.2	208.4	325.5
All species	334.0	268.7	202.1	179.6	470.3	212.9	347.2

Species	Jefferson	Lawrence	Meigs	Monroe	Morgan	Muskingum	Noble
White pine [1]	4.5	—	1.2	6.2	1.0	5.3	2.4
Yellow pines [2]	.2	35.4	7.4	1.0	4.8	.2	.1
Other softwoods [3]	2.6	1.1	.2	2.9	.2	2.7	1.7
Total softwoods	7.3	36.5	8.8	10.1	6.0	8.2	4.2
Select white oaks	38.7	101.6	82.4	50.8	41.0	44.0	21.7
Select red oaks	24.8	42.2	37.9	31.6	20.2	27.5	13.5
Chestnut oak [4]	8.3	70.1	34.5	12.4	15.6	9.5	5.4
Other red oaks	33.4	87.4	72.0	45.4	34.9	38.5	20.0
Hickory	25.3	44.9	29.7	32.2	16.6	29.1	15.5
Sugar maple	12.2	17.4	16.1	15.2	9.5	13.6	6.5
Soft maples	13.1	9.7	6.2	15.7	3.4	14.7	7.6
Beech	22.2	11.6	18.5	27.1	8.1	24.1	11.2
White ash [5]	14.3	20.8	10.9	18.4	7.1	16.4	8.3
Aspen [6]	3.7	2.0	1.8	4.6	1.4	4.2	2.4
Basswood	2.7	2.9	2.7	3.0	1.6	3.8	1.6
Yellow-poplar	36.3	49.8	44.2	46.3	25.7	41.0	26.2
Black walnut	6.6	7.9	8.8	8.7	8.4	8.4	4.4
Black cherry	12.7	4.5	3.9	16.1	2.3	14.8	7.0
Sycamore	4.8	12.0	9.0	6.1	6.2	5.4	2.7
Black locust	3.2	1.1	1.6	4.4	.8	4.0	2.0
Elm	28.4	7.5	11.8	35.2	6.4	33.7	18.2
Sassafras	.5	1.8	.6	.6	.4	.5	.4
Other hardwoods	7.4	13.0	9.0	9.5	5.1	8.6	4.6
Total hardwoods	298.6	508.2	401.6	383.3	214.7	341.8	179.2
All species	305.9	544.7	410.4	393.4	220.7	350.0	183.4

CONTINUED

Table 10—*Continued*

Species	Perry	Pike	Ross	Scioto	Tuscarawas	Vinton	Washington
White pine [1]	1.1	—	—	—	3.7	1.5	2.2
Yellow pines [2]	8.1	21.0	20.2	31.2	.1	9.5	13.2
Other softwoods [3]	.1	1.0	1.0	1.2	2.7	.2	.3
Total softwoods	9.3	22.0	21.2	32.4	6.5	11.2	15.7
Select white oaks	54.2	84.7	81.8	128.0	36.1	99.7	110.7
Select red oaks	25.3	32.7	37.6	52.9	22.2	45.7	52.0
Chestnut oak [4]	23.1	59.7	62.7	87.9	8.0	43.6	46.6
Other red oaks	51.0	65.8	72.8	104.4	32.2	84.9	95.1
Hickory	19.9	41.7	39.0	62.5	24.3	36.8	42.2
Sugar maple	10.2	18.7	17.3	26.6	10.6	19.5	22.5
Soft maples	4.2	9.8	10.5	14.7	12.6	7.5	9.1
Beech	10.6	10.1	11.1	15.7	19.5	20.9	22.0
White ash [5]	7.7	21.3	21.4	31.6	13.0	13.1	16.0
Aspen [6]	1.5	1.7	1.5	2.1	3.8	2.1	2.9
Basswood	1.7	2.7	3.4	4.5	2.9	3.1	3.6
Yellow-poplar	33.4	33.6	35.5	54.7	37.4	54.7	66.2
Black walnut	7.5	6.9	6.3	9.9	6.8	9.2	13.7
Black cherry	2.6	3.8	3.8	5.8	11.8	4.7	5.5
Sycamore	5.9	11.1	11.2	16.9	4.2	11.3	13.6
Black locust	.9	1.1	.9	1.9	3.0	1.8	2.0
Elm	6.9	7.2	6.5	11.1	27.7	13.8	15.1
Sassafras	.5	1.6	1.4	2.5	.5	.8	1.1
Other hardwoods	5.9	11.7	13.3	19.6	7.3	10.8	12.6
Total hardwoods	273.0	425.9	438.0	653.3	283.9	484.0	552.5
All species	282.3	447.9	459.2	685.7	290.4	495.2	568.2

[1] Includes a small amount of red pine.
[2] Includes Virginia, shortleaf, and pitch pine.
[3] Includes hemlock and eastern redcedar.
[4] Includes other white oaks.
[5] Includes other ash.
[6] Includes cottonwood.

Table 11.—*Area in the Hill Country of Ohio, by land classes and geographic units, 1967*

[In thousands of acres]

Land class	South-Central	South-eastern	East-Central	Total
Forest land:				
Commercial	1,541.7	1,272.7	1,566.9	4,381.3
Productive-reserved	5.6	8.8	20.8	35.2
Total [1]	1,547.3	1,281.5	1,587.7	4,416.5
Nonforest land	1,760.4	792.7	1,830.0	4,383.1
Total area [2]	3,307.7	2,074.2	3,417.7	8,799.6
	Sampling errors, in percent			
Commercial forest land	1.9	2.2	2.6	1.3

[1] There is no unproductive forest land in these units.
[2] Land area from U. S. Bureau of the Census, Land and Water Area of Ohio: 1960.

Table 12.—*Area of commercial forest land in the Hill Country of Ohio, by ownership classes and geographic units, 1967*

[In thousands of acres]

Ownership class	South-Central	South-eastern	East-Central	Total
National forest	49.0	59.0	4.3	112.3
Other public	113.9	45.5	32.2	191.6
Total public	162.9	104.5	36.5	303.9
Pulp and paper industry	60.7	37.6	—	98.3
Lumber industry	5.7	3.7	8.2	17.6
Other forest industry	3.4	3.6	3.9	10.9
Total forest industry	69.8	44.9	12.1	126.8
Farmer-owned	570.5	514.9	587.6	1,673.0
Miscellaneous private	738.5	608.4	930.7	2,277.6
All ownerships	1,541.7	1,272.7	1,566.9	4,381.3
	Sampling errors, in percent [1]			
Forest industry	20	27	58	16
Farmer-owned	6	7	7	4
Miscellaneous private	5	6	5	3

[1] There are no sampling errors for public ownership. Areas were obtained from public records.

Table 13.—*Area of commercial forest land in the Hill Country of Ohio, by stand-size classes and geographic units, 1967*

[In thousands of acres]

Stand-size class	South-Central	South-eastern	East-Central	Total
Sawtimber stands	494.7	397.2	367.3	1,259.2
Poletimber stands	225.3	153.6	179.5	558.4
Sapling-seedling stands	798.9	680.7	966.8	2,446.4
Nonstocked areas	22.8	41.2	53.3	117.3
All classes	1,541.7	1,272.7	1,566.9	4,381.3
	Sampling errors, in percent			
Sawtimber stands	6	7	8	4
Poletimber stands	11	14	14	8
Sapling-seedling stands	5	5	5	3
Nonstocked areas	37	29	32	19

Table 14.—*Area of commercial forest land in the Hill Country of Ohio by stand-volume classes and geographic units, 1967*

[In thousands of acres]

Stand volume [1] per acre	South-Central	South-eastern	East-Central	Total
Less than 1,500 board feet	641.5	574.1	877.0	2,092.6
1,500 to 5,000 board feet	638.0	519.4	544.0	1,701.4
More than 5,000 board feet	262.2	179.2	145.9	587.3
All classes	1,541.7	1,272.7	1,566.9	4,381.3

[1] Net volume, International ¼-inch rule.

Table 15.—*Area of commercial forest land in the Hill Country of Ohio, by stocking classes of growing-stock trees, and geographic units, 1967*

[In thousands of acres]

Stocking percentage class	South-Central	South-eastern	East-Central	Total
Overstocked	36.3	14.2	22.7	73.2
100 to 129	347.0	267.6	203.6	818.2
90 to 99	143.6	165.9	165.1	474.6
80 to 89	257.4	171.6	151.2	580.2
70 to 79	219.3	168.5	197.4	585.2
60 to 69	194.6	135.7	235.1	565.4
50 to 59	131.2	121.6	202.6	455.4
40 to 49	85.5	77.0	136.7	299.2
30 to 39	69.8	75.1	115.4	260.3
20 to 29	36.8	37.2	77.3	151.3
10 to 19	13.4	21.5	39.3	74.2
Less than 10	6.8	16.8	20.5	44.1
All classes	1,541.7	1,272.7	1,566.9	4,381.3

Table 16.—Area of commercial forest land in the Hill Country of Ohio, *by stocking classes based on selected stand components, 1967*

[In thousands of acres]

Stocking percentage class	Stocking classified in terms of —			
	All trees	Growing-stock trees	Desirable trees	Acceptable trees
Overstocked	875.1	73.2	4.2	67.4
100 to 129	2,291.9	818.2	—	655.3
90 to 99	481.8	474.6	—	402.8
80 to 89	276.2	580.2	2.9	556.1
70 to 79	167.6	585.2	1.6	639.0
60 to 69	96.8	565.4	11.4	585.9
50 to 59	76.7	455.4	21.3	490.9
40 to 49	42.8	299.2	58.4	398.8
30 to 39	58.0	260.3	171.4	262.4
20 to 29	7.1	151.3	311.1	152.7
10 to 19	7.3	74.2	815.3	104.9
Less than 10	—	44.1	2,983.7	65.1
All classes	4,381.3	4,381.3	4,381.3	4,381.3

Table 17.—*Area of commercial forest land in the Hill Country of Ohio, by site classes and geographic units, 1967*

[In thousands of acres]

Site class [1] (cubic-foot growth per acre per year)	South-Central	South-eastern	East-Central	Total
Over 120	94.2	79.5	156.5	330.2
85 to 120	262.3	201.4	249.1	712.8
50 to 85	582.6	454.7	666.9	1,704.2
Under 50	602.6	537.1	494.4	1,634.1
All classes	1,541.7	1,272.7	1,566.9	4,381.3
	Sampling errors, in percent			
Over 120	18	20	15	10
85 to 120	10	12	12	7
50 to 85	6	7	7	4
Under 50	6	7	8	4

[1] Site class is the potential growth per acre attainable in fully stocked stands at culmination of mean annual growth.

Table 18.—*Area of commercial forest land in the Hill Country of Ohio, by forest types and geographic units, 1967*

[In thousands of acres]

Forest type	South-Central	South-eastern	East-Central	Total
White-red pine [1]	8.7	6.1	37.5	52.3
Virginia-shortleaf pine	106.2	57.0	11.7	174.9
Oak-pine	110.1	74.7	112.9	297.7
Oak-hickory	924.7	768.2	600.2	2,293.1
Oak-gum	8.5	13.2	4.3	26.0
Elm-ash-cottonwood	196.9	149.4	457.7	804.0
Maple-beech-birch	180.4	197.2	303.3	680.9
Aspen-paper birch	6.2	6.9	39.3	52.4
All types	1,541.7	1,272.7	1,566.9	4,381.3
Sampling errors, in percent				
White-red-pine	*	*	33	26
Virginia-shortleaf pine	17	26	*	14
Oak-pine	17	23	21	12
Oak-hickory	4	5	7	3
Oak-gum	*	*	*	42
Elm-ash-cottonwood	12	16	8	6
Maple-beech-birch	14	13	10	7
Aspen-paper birch	*	*	31	25

[1] Includes a small acreage in spruce plantations.
* Sampling error over 50 percent.

Table 19.—*Number of growing-stock trees on commercial forest land in the Hill Country of Ohio by diameter classes and species groups, 1967*

[In thousands of trees]

Diameter class (inches)	All species	Softwoods	Hardwoods
1.0 to 2.9	557,430	25,717	531,713
3.0 to 4.9	229,478	18,418	211,060
5.0 to 6.9	113,045	8,656	104,389
7.0 to 8.9	70,806	4,930	65,876
9.0 to 10.9	47,089	2,316	44,773
11.0 to 12.9	29,713	1,065	28,648
13.0 to 14.9	18,337	447	17,890
15.0 to 16.9	10,334	109	10,225
17.0 to 18.9	5,430	80	5,350
19.0 to 20.9	2,789	5	2,784
21.0 and larger	3,048	17	3,031
All classes	1,087,499	61,760	1,025,739

Table 20.—*Net volume of timber on commercial forest land in the Hill Country of Ohio, by class of timber and geographic units, 1967*

[In millions of cubic feet]

Class of timber	South-Central	South-eastern	East-Central	Total
Sawtimber trees:				
Sawlogs	584.5	445.3	438.0	1,467.8
Upper stems	134.1	103.2	100.9	338.2
Total	718.6	548.5	538.9	1,806.0
Poletimber trees	433.8	300.7	346.3	1,080.8
Total growing stock	1,152.4	849.2	885.2	2,886.8
Rough trees:				
Sawtimber size	47.5	33.1	56.9	137.5
Poletimber size	41.4	21.2	35.0	97.6
Total	88.9	54.3	91.9	235.1
Rotten trees:				
Sawtimber size	44.3	42.4	40.0	126.7
Poletimber size	15.5	9.8	8.3	33.6
Total	59.8	52.2	48.3	160.3
Total, all timber	1,301.1	955.7	1,025.4	3,282.2
Sampling errors, in percent				
Sawtimber trees	3	3	3	2
Poletimber trees	3	4	4	2
All growing stock	2	2	3	1
Rough trees	7	8	9	5
Rotten trees	6	8	9	5

Table 21.—*Net volume of timber on commercial forest land in the Hill Country of Ohio, by class of timber and species groups, 1967*

[In millions of cubic feet]

Class of timber	Softwoods	Hardwoods	All species
Sawtimber trees:			
Sawlogs	52.3	1,415.5	1,467.8
Upper stems	7.9	330.3	338.2
Total	60.2	1,745.8	1,806.0
Poletimber trees	49.9	1,030.9	1,080.8
Total growing stock	110.1	2,776.7	2,886.8
Rough trees:			
Sawtimber size	1.3	136.2	137.5
Poletimber size	3.2	94.4	97.6
Total	4.5	230.6	235.1
Rotten trees:			
Sawtimber size	.9	125.8	126.7
Poletimber size	.4	33.2	33.6
Total	1.3	159.0	160.3
Total, all timber	115.9	3,166.3	3,282.2

Table 22.—*Net volume of growing stock on commercial forest land in the Hill Country of Ohio, by ownership classes and geographic units, 1967*

[In millions of cubic feet]

Ownership class and species group	South-Central	South-eastern	East-Central	Total
National forest:				
Softwoods	3.6	4.2	0.3	8.1
Hardwoods	40.5	48.8	3.5	92.8
Total	44.1	53.0	3.8	100.9
Other public:				
Softwoods	7.0	1.0	2.8	10.8
Hardwoods	121.2	41.5	8.6	171.3
Total	128.2	42.5	11.4	182.1
Forest industry:				
Softwoods	1.3	3.1	—	4.4
Hardwoods	61.3	44.2	6.6	112.1
Total	62.6	47.3	6.6	116.5
Other private:				
Softwoods	42.2	19.3	25.3	86.8
Hardwoods	875.3	687.1	838.1	2,400.5
Total	917.5	706.4	863.4	2,487.3
All ownerships:				
Softwoods	54.1	27.6	28.4	110.1
Hardwoods	1,098.3	821.6	856.8	2,776.7
Total	1,152.4	849.2	885.2	2,886.8
Sampling errors, in percent				
Totals only:				
National forest	9	9	9	9
Other public	16	22	44	13
Forest industry	23	28	*	17
Other private	4	4	3	2

* Sampling errors of 50 to 99 percent.

Table 23.—*Net volume of sawtimber on commercial forest land in the Hill Country of Ohio, by ownership classes and geographic units, 1967*

[In millions of board feet]

Ownership class and species group	South-Central	South-eastern	East-Central	Total
National forest:				
Softwoods	9.7	11.6	0.8	22.1
Hardwoods	150.2	180.6	13.1	343.9
Total	159.9	192.2	13.9	366.0
Other public:				
Softwoods	29.5	3.2	1.0	33.7
Hardwoods	412.8	158.4	23.8	595.0
Total	442.3	161.6	24.8	628.7
Forest industry:				
Softwoods	4.4	13.8	—	18.2
Hardwoods	233.7	150.5	23.5	407.7
Total	238.1	164.3	23.5	425.9
Other private:				
Softwoods	145.0	51.2	68.0	264.2
Hardwoods	2,828.6	2,383.6	2,902.9	8,115.1
Total	2,973.6	2,434.8	2,970.9	8,379.3
All ownerships:				
Softwoods	188.6	79.8	69.8	338.2
Hardwoods	3,625.3	2,873.1	2,963.3	9,461.7
Total	3,813.9	2,952.9	3,033.1	9,799.9
Sampling errors, in percent				
Totals only:				
National forest	11	11	11	11
Other public	17	23	*	14
Forest industry	26	30	*	19
Other private	3	5	3	2

* Sampling errors of 50 to 99 percent.

Table 24.—*Net volume of growing stock on commercial forest land in the Hill Country of Ohio, by stand-size classes and geographic units, 1967*

[In millions of cubic feet]

Stand-size class and species group	South-Central	South-eastern	East-Central	Total
Sawtimber stands:				
Softwoods	19.9	7.3	12.7	39.9
Hardwoods	609.5	477.6	429.5	1,516.6
Total	629.4	484.9	442.2	1,556.5
Poletimber stands:				
Softwoods	19.0	10.7	12.2	41.9
Hardwoods	198.6	119.4	150.9	468.9
Total	217.6	130.1	163.1	510.8
Other stands:				
Softwoods	15.2	9.6	3.5	28.3
Hardwoods	290.2	224.6	276.4	791.2
Total	305.4	234.2	279.9	819.5
All stands:				
Softwoods	54.1	27.6	28.4	110.1
Hardwoods	1,098.3	821.6	856.8	2,776.7
Total	1,152.4	849.2	885.2	2,886.8
Sampling errors, in percent				
Sawtimber stands	5	5	7	3
Poletimber stands	11	14	13	7
Other stands	7	8	8	4
All stands:				
Softwoods	16	22	40	14
Hardwoods	2	2	3	1
Total	2	2	3	1

Table 25.—*Net volume of sawtimber on commercial forest land in the Hill Country of Ohio, by stand-size classes and geographic units, 1967*

[In millions of board feet]

Stand-size class and species group	South-Central	South-eastern	East-Central	Total
Sawtimber stands:				
Softwoods	87.2	29.7	51.1	168.0
Hardwoods	2,383.6	1,938.1	1,789.1	6,110.8
Total	2,470.8	1,967.8	1,840.2	6,278.8
Poletimber stands:				
Softwoods	51.9	25.1	4.3	81.3
Hardwoods	427.3	255.5	344.0	1,026.8
Total	479.2	280.6	348.3	1,108.1
Other stands:				
Softwoods	49.5	25.0	14.4	88.9
Hardwoods	814.4	679.5	830.2	2,324.1
Total	863.9	704.5	844.6	2,413.0
All stands:				
Softwoods	188.6	79.8	69.8	338.2
Hardwoods	3,625.3	2,873.1	2,963.3	9,461.7
Total	3,813.9	2,952.9	3,033.1	9,799.9
	Sampling errors, in percent			
Sawtimber stands	5	5	6	3
Poletimber stands	13	16	16	9
Other stands	9	10	10	6
All stands:				
Softwoods	17	23	*	15
Hardwoods	3	3	3	2
Total	3	3	3	2

* Sampling error of 50 to 99 percent.

Table 26.—*Growing-stock volume in the South-Central Unit of Ohio, by species and diameter classes, 1967*

[In millions of cubic feet]

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	1.1	0.9	0.2	—	—	—	—	—	—	—	—
Virginia pine	35.4	3.9	10.0	9.2	7.2	4.1	0.5	0.5	—	—	—
Other yellow pine	14.9	1.2	2.9	3.9	1.8	1.9	1.8	1.1	0.2	0.1	—
Other softwoods	2.7	.5	.8	.5	—	.4	—	.2	—	—	0.3
Total softwoods	54.1	6.5	13.9	13.6	9.0	6.4	2.3	1.8	0.2	0.1	0.3
Select white oaks	192.3	11.0	18.0	30.2	34.9	29.2	27.7	15.6	8.6	15.0	2.1
Select red oaks	72.0	2.6	5.9	8.2	11.5	11.1	10.4	6.3	5.3	9.8	.9
Chestnut oak [1]	151.2	9.3	18.6	28.1	26.2	26.3	17.5	11.7	7.1	5.7	.7
Other red oaks	152.0	3.7	13.4	23.6	23.8	27.0	21.0	19.8	8.6	10.8	.3
Hickory	135.5	12.6	24.8	29.3	27.9	19.2	10.4	5.9	2.8	2.6	—
Sugar maple	51.7	7.8	10.8	8.9	7.4	5.3	5.3	2.2	2.4	1.3	.3
Soft maples	28.6	4.9	5.2	4.4	4.8	4.7	1.6	.4	.5	1.5	.6
Beech	15.8	.8	.8	1.1	2.0	2.2	1.8	1.2	2.7	2.3	.9
White ash [1]	57.1	5.3	6.7	10.6	10.7	9.6	6.3	3.4	1.8	2.7	—
Aspen [1]	5.9	.8	1.6	.8	1.0	.4	—	—	.3	1.0	—
Basswood	6.5	.3	.4	1.3	1.1	1.3	.8	.7	.2	.4	—
Yellow-poplar	74.7	3.8	7.3	9.9	11.8	11.1	11.8	9.3	3.6	5.1	1.0
Black walnut	22.6	1.9	4.5	4.2	3.7	2.9	2.3	1.2	.9	1.0	—
Black cherry	13.4	.6	2.2	3.7	1.7	3.1	1.3	.1	.2	.5	—
Sycamore	24.9	1.8	1.5	2.7	3.2	3.6	2.6	2.8	1.2	3.7	1.8
Black locust	11.3	3.1	2.7	3.8	.7	.4	.2	.2	.2	—	—
Elm	27.1	4.3	4.9	6.5	2.9	4.7	2.3	1.0	—	.5	—
Sassafras	15.9	5.1	6.2	2.1	1.7	.8	—	—	—	—	—
Other hardwoods	39.8	4.6	7.0	7.2	4.7	6.1	5.2	3.6	.7	.7	—
Total hardwoods	1,098.3	84.3	142.5	186.6	181.7	169.0	128.5	85.4	47.1	64.6	8.6
All species	1,152.4	90.8	156.4	200.2	190.7	175.4	130.8	87.2	47.3	64.7	8.9

[1] Includes a small volume of other closely related species. See table 9.

Table 27.—*Growing-stock volume in the Southeastern Unit of Ohio, by species and diameter classes, 1967*

[In millions of cubic feet]

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	6.3	2.7	1.7	0.5	0.5	0.6	0.3	—	—	—	—
Virginia pine	14.7	1.9	3.8	3.9	3.2	1.4	—	0.5	—	—	—
Other yellow pine	4.9	.5	1.2	.3	1.7	.7	—	.4	—	0.1	—
Other softwoods	1.7	1.2	.3	—	—	.2	—	—	—	—	—
Total softwoods	27.6	6.3	7.0	4.7	5.4	2.9	0.3	0.9	—	0.1	—
Select white oaks	154.1	6.9	12.0	25.3	30.0	30.8	17.5	15.1	4.6	7.7	4.2
Select red oaks	65.4	1.9	3.8	9.1	8.5	7.5	8.6	7.5	6.4	10.6	1.5
Chestnut oak [1]	72.8	4.2	10.2	11.3	16.8	9.9	9.1	3.0	3.1	5.2	—
Other red oaks	120.7	3.3	7.4	13.9	18.5	17.8	16.1	18.3	8.5	14.9	2.0
Hickory	87.9	9.3	18.3	16.4	18.9	10.5	9.1	4.4	.5	.5	—
Sugar maple	37.2	5.0	6.2	6.6	7.3	4.0	3.0	2.3	2.0	.6	.2
Soft maples	20.1	3.2	4.8	4.5	2.4	2.0	1.4	1.6	—	.2	—
Beech	23.6	1.1	1.8	2.3	3.2	2.9	4.6	1.2	1.2	4.5	.8
White ash [1]	28.6	3.9	3.6	5.0	5.9	2.3	3.8	1.8	1.5	.5	.3
Aspen [1]	9.6	2.6	3.0	1.2	1.1	1.4	—	—	—	.3	—
Basswood	5.1	.2	.6	.8	.8	.6	.6	.9	.6	—	—
Yellow-poplar	86.4	5.5	9.8	13.3	9.6	15.3	12.7	6.0	5.9	7.4	.9
Black walnut	18.8	1.7	2.9	2.6	3.1	3.3	2.5	1.1	1.3	.3	—
Black cherry	10.1	.6	2.1	2.0	1.6	2.2	1.0	.3	—	.3	—
Sycamore	17.2	1.2	1.4	1.8	1.9	1.4	2.0	1.4	.7	3.5	1.9
Black locust	5.4	.6	1.2	1.5	1.4	.7	—	—	—	—	—
Elm	31.0	3.6	6.3	5.9	4.7	3.6	1.6	2.0	2.3	.8	.2
Sassafras	4.1	1.3	1.2	.5	.3	.8	—	—	—	—	—
Other hardwoods	23.5	3.0	5.3	2.4	4.9	2.4	1.6	1.7	1.1	.8	.3
Total hardwoods	821.6	59.1	101.9	126.4	140.9	119.4	95.2	68.6	39.7	58.1	12.3
All species	849.2	65.4	108.9	131.1	146.3	122.3	95.5	69.5	39.7	58.2	12.3

[1] Includes a small volume of other closely related species. See table 9.

Table 28.—*Growing-stock volume in the East-Central Unit of Ohio, by species and diameter classes, 1967*

[In millions of cubic feet]

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	18.3	3.7	7.5	3.6	2.4	0.6	0.3	—	—	0.2	—
Virginia pine	.4	—	.3	.1	—	—	—	—	—	—	—
Other yellow pine	4.0	2.6	1.1	.3	—	—	—	—	—	—	—
Other softwoods	5.7	.5	.5	2.0	1.1	.3	.3	0.3	—	.7	—
Total softwoods	28.4	6.8	9.4	6.0	3.5	0.9	0.6	0.3	—	0.9	—
Select white oaks	97.9	5.3	10.5	12.2	12.4	15.0	11.8	8.9	5.8	12.1	3.9
Select red oaks	60.0	2.7	6.5	7.9	6.9	4.1	4.3	6.2	3.6	13.6	4.2
Chestnut oak [1]	21.0	.9	1.2	3.1	3.1	1.8	3.2	2.9	1.9	2.9	—
Other red oaks	84.3	3.3	7.6	11.9	14.1	11.3	10.8	8.0	6.8	8.0	2.5
Hickory	80.7	7.3	12.5	12.0	14.7	13.2	8.6	4.6	4.3	3.5	—
Sugar maple	35.6	5.1	5.8	6.4	3.5	5.6	4.2	2.1	1.2	.9	.8
Soft maple	42.1	6.8	7.9	6.7	7.5	6.2	3.3	1.7	.8	1.2	—
Beech	37.3	1.4	2.8	2.5	3.8	4.9	4.3	3.7	5.7	6.0	2.2
White ash [1]	40.9	3.3	4.1	7.3	7.6	5.5	4.4	2.6	3.2	2.7	.2
Aspen [1]	20.4	5.1	5.5	2.7	3.2	3.2	.5	.2	—	—	—
Basswood	6.0	.3	.3	.4	.4	1.5	.5	.4	1.7	.5	—
Yellow-poplar	88.9	6.5	10.0	11.9	15.9	13.6	12.0	6.3	3.9	8.0	.8
Black walnut	27.0	4.0	4.7	5.6	6.0	1.7	3.2	.8	.4	.6	—
Black cherry	51.9	6.8	10.9	10.4	11.7	5.9	3.4	1.0	1.3	.5	—
Sycamore	9.6	.1	1.0	.2	.3	1.6	1.2	2.2	.6	1.3	1.1
Black locust	22.3	5.2	5.8	5.6	1.3	2.1	1.1	.9	.3	—	—
Elm	101.8	11.0	16.5	20.7	15.8	13.9	9.9	3.7	3.1	5.7	1.5
Sassafras	7.1	2.8	2.3	1.0	.5	.3	.2	—	—	—	—
Other hardwoods	22.0	1.8	2.9	3.1	3.9	3.6	3.2	2.1	—	1.4	—
Total hardwoods	856.8	79.7	118.8	131.6	132.6	115.0	90.1	58.3	44.6	68.9	17.2
All species	885.2	86.5	128.2	137.6	136.1	115.9	90.7	58.6	44.6	69.8	17.2

[1] Includes a small volume of other related species. See table 9.

Table 29.—*Total growing-stock volume in the Hill Country of Ohio, by species and diameter classes, 1967*

[In millions of cubic feet]

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	25.7	7.3	9.4	4.1	2.9	1.2	0.6	—	—	0.2	—
Virginia pine	50.5	5.8	14.1	13.2	10.4	5.5	.5	1.0	—	—	—
Other yellow pines	23.8	4.3	5.2	4.5	3.5	2.6	1.8	1.5	0.2	.2	—
Other softwoods	10.1	2.2	1.6	2.5	1.1	.9	.3	.5	—	.7	0.3
Total softwoods	110.1	19.6	30.3	24.3	17.9	10.2	3.2	3.0	0.2	1.1	0.3
Select white oaks	444.3	23.2	40.5	67.7	77.3	75.0	57.0	39.6	19.0	34.8	10.2
Select red oaks	197.4	7.2	16.2	25.2	26.9	22.7	23.3	20.0	15.3	34.0	6.6
Chestnut oak [1]	245.0	14.4	30.0	42.5	46.1	38.0	29.8	17.6	12.1	13.8	.7
Other red oaks	357.0	10.3	28.4	49.4	56.4	56.1	47.9	46.1	23.9	33.7	4.8
Hickory	304.1	29.2	55.6	57.7	61.5	42.9	28.1	14.9	7.6	6.6	—
Sugar maple	124.5	17.9	22.8	21.9	18.2	14.9	12.5	6.6	5.6	2.8	1.3
Soft maples	90.8	14.9	17.9	15.6	14.7	12.9	6.3	3.7	1.3	2.9	.6
Beech	76.7	3.3	5.4	5.9	9.0	10.0	10.7	6.1	9.6	12.8	3.9
White ash [1]	126.6	12.5	14.4	22.9	24.2	17.4	14.5	7.8	6.5	5.9	.5
Aspen [1]	35.9	8.5	10.1	4.7	5.3	5.0	.5	.2	.3	1.3	—
Basswood	17.6	.8	1.3	2.5	2.3	3.4	1.9	2.0	2.5	.9	—
Yellow-poplar	250.0	15.8	27.1	35.1	37.3	40.0	36.5	21.6	13.4	20.5	2.7
Black walnut	68.4	7.6	12.1	12.4	12.8	7.9	8.0	3.1	2.6	1.9	—
Black cherry	75.4	8.0	15.2	16.1	15.0	11.2	5.7	1.4	1.5	1.3	—
Sycamore	51.7	3.1	3.9	4.7	5.4	6.6	5.8	6.4	2.5	8.5	4.8
Black locust	39.0	8.9	9.7	10.9	3.4	3.2	1.3	1.1	.5	—	—
Elm	159.9	18.9	27.7	33.1	23.4	22.2	13.8	6.7	5.4	7.0	1.7
Sassafras	27.1	9.2	9.7	3.6	2.5	1.9	.2	—	—	—	—
Other hardwoods	85.3	9.4	15.2	12.7	13.5	12.1	10.0	7.4	1.8	2.9	.3
Total hardwoods	2,776.7	223.1	363.2	444.6	455.2	403.4	313.8	212.3	131.4	191.6	38.1
All species	2,886.8	242.7	393.5	468.9	473.1	413.6	317.0	215.3	131.6	192.7	38.4

[1] Includes a small volume of other related species. See table 9.

Table 30.—*Sawtimber volume in the South-Central Unit of Ohio, by species and diameter classes, 1967*

[In millions of board feet]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	—	—	—	—	—	—	—	—	—
Virginia pine	117.8	46.7	40.4	24.5	3.1	3.1	—	—	—
Other yellow pine	61.4	19.3	10.7	11.2	11.4	6.8	1.6	0.4	—
Other softwoods	9.4	3.5	—	2.6	—	1.4	—	—	1.9
Total softwoods	188.6	69.5	51.1	38.3	14.5	11.3	1.6	0.4	1.9
Select white oaks	698.8	—	182.7	155.9	146.9	79.6	45.2	77.9	10.6
Select red oaks	294.8	—	56.7	59.6	54.3	34.0	29.6	55.4	5.2
Chestnut oak [1]	485.8	—	130.0	133.3	91.2	59.6	37.3	30.6	3.8
Other red oaks	588.1	—	116.0	145.4	110.6	105.2	47.9	60.9	2.1
Hickory	337.7	—	133.4	95.1	52.0	29.5	14.4	13.3	—
Sugar maple	143.5	—	42.7	31.5	31.6	13.2	14.6	8.5	1.4
Soft maples	85.5	—	28.7	28.3	9.7	2.4	2.7	9.9	3.8
Beech	85.7	—	12.3	14.9	11.5	7.5	18.5	15.0	6.0
White ash [1]	170.8	—	53.1	47.5	31.4	16.4	9.2	13.2	—
Aspen [1]	13.8	—	5.2	2.1	—	—	1.3	5.2	—
Basswood	24.5	—	5.7	7.4	4.4	3.7	1.0	2.3	—
Yellow-poplar	311.6	—	66.2	64.9	68.6	54.4	21.5	30.5	5.5
Black walnut	62.3	—	18.5	15.5	12.7	6.2	4.4	5.0	—
Black cherry	35.0	—	8.2	15.8	6.5	.6	1.3	2.6	—
Sycamore	98.4	—	17.4	19.1	13.2	14.0	6.4	19.2	9.1
Black locust	9.3	—	3.3	2.2	1.2	1.3	1.3	—	—
Elm	59.0	—	15.2	24.4	11.8	5.2	—	2.4	—
Sassafras	13.6	—	9.2	4.4	—	—	—	—	—
Other hardwoods	107.1	—	23.8	31.7	26.4	18.0	3.7	3.5	—
Total hardwoods	3,625.3	—	928.3	899.0	684.0	450.8	260.3	355.4	47.5
All species	3,813.9	69.5	979.4	937.3	698.5	462.1	261.9	355.8	49.4

[1] Includes a small volume of other closely related species. See table 10.

Table 31.—*Sawtimber volume in the Southeastern Unit of Ohio, by species and diameter classes, 1967*

[In millions of board feet]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	10.6	2.5	3.0	3.3	1.8	—	—	—	—
Virginia pine	49.3	20.0	17.2	8.4	—	3.7	—	—	—
Other yellow pine	18.5	1.0	9.6	4.7	.4	2.3	—	0.5	—
Other softwoods	1.4	—	—	1.4	—	—	—	—	—
Total softwoods	79.8	23.5	29.8	17.8	2.2	6.0	—	0.5	—
Select white oaks	579.9	—	157.7	165.5	93.1	78.5	23.7	40.7	20.7
Select red oaks	270.8	—	40.7	39.2	44.6	41.1	36.3	60.1	8.8
Chestnut oak [1]	241.4	—	82.5	52.3	47.5	15.7	16.3	27.1	—
Other red oaks	508.7	—	89.3	93.3	84.9	98.7	48.0	84.1	10.4
Hickory	214.1	—	89.4	51.5	46.4	21.5	2.6	2.7	—
Sugar maple	115.0	—	42.7	24.3	17.6	13.9	12.0	3.3	1.2
Soft maples	46.1	—	14.2	12.0	8.2	10.0	.4	1.3	—
Beech	121.3	—	22.0	19.3	30.4	7.8	7.3	29.8	4.7
White ash [1]	80.7	—	29.3	11.8	19.4	8.3	7.9	2.6	1.4
Aspen [1]	14.4	—	5.3	7.4	—	—	—	1.7	—
Basswood	19.1	—	3.6	3.3	3.7	5.0	3.5	—	—
Yellow-poplar	338.1	—	53.3	88.4	74.9	35.6	34.8	45.2	5.9
Black walnut	68.7	—	18.6	21.8	14.7	5.4	6.8	1.4	—
Black cherry	28.1	—	7.6	11.3	5.7	2.0	—	1.5	—
Sycamore	66.4	—	9.6	7.6	10.8	7.0	3.8	18.1	9.5
Black locust	10.5	—	7.0	3.5	—	—	—	—	—
Elm	78.8	—	23.8	19.5	7.9	10.2	12.0	4.2	1.2
Sassafras	5.2	—	1.2	4.0	—	—	—	—	—
Other hardwoods	65.8	—	24.5	12.8	8.1	8.7	5.8	4.5	1.4
Total hardwoods	2,873.1	—	722.3	648.8	517.9	369.4	221.2	328.3	65.2
All species	2,952.9	23.5	752.1	666.6	520.1	375.4	221.2	328.8	65.2

[1] Includes a small volume of other closely related species. See table 10.

Table 32.—*Sawtimber volume in the East-Central Unit of Ohio, by species and diameter classes, 1967*

[In millions of board feet]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	40.8	19.4	14.2	3.8	2.0	—	—	1.4	—
Virginia pine	.6	.3	.2	.1	—	—	—	—	—
Other yellow pines	1.6	1.5	—	—	—	0.1	—	—	—
Other softwoods	26.8	10.5	6.7	1.8	1.5	2.1	—	4.2	—
Total softwoods	69.8	31.7	21.1	5.7	3.5	2.2	—	5.6	—
Select white oaks	382.7	—	69.1	84.7	63.7	48.1	32.0	65.1	20.0
Select red oaks	238.6	—	35.4	21.7	24.1	33.2	20.3	79.9	24.0
Chestnut oaks [1]	84.2	—	15.9	9.9	16.5	15.0	10.7	16.2	—
Other red oaks	337.0	—	72.4	61.4	59.0	44.0	38.8	47.2	14.2
Hickory	252.9	—	74.5	68.1	43.9	24.1	22.9	19.4	—
Sugar maple	115.3	—	21.8	35.3	26.7	12.9	7.8	6.0	4.8
Soft maples	130.6	—	46.3	39.4	20.9	10.9	5.4	7.7	—
Beech	210.5	—	24.8	34.3	30.2	25.5	39.8	40.9	15.0
White ash [1]	136.6	—	40.2	28.0	22.8	13.3	17.0	14.1	1.2
Aspen [1]	38.2	—	16.9	17.1	2.9	1.3	—	—	—
Basswood	29.1	—	2.0	8.3	3.2	2.6	9.8	3.2	—
Yellow-poplar	367.8	—	93.9	83.1	72.8	38.6	24.9	49.5	5.0
Black walnut	69.4	—	33.3	8.9	17.8	4.5	1.9	3.0	—
Black cherry	124.5	—	58.7	31.1	18.4	5.5	7.8	3.0	—
Sycamore	45.4	—	1.6	8.8	6.7	12.4	3.0	7.2	5.7
Black locust	31.3	—	7.1	12.1	5.9	4.6	1.6	—	—
Elm	288.1	—	85.4	75.1	53.0	19.2	17.1	30.6	7.7
Sassafras	5.2	—	2.5	1.5	1.2	—	—	—	—
Other hardwoods	75.9	—	20.0	19.3	17.5	11.2	—	7.9	—
Total hardwoods	2,963.3	—	721.8	648.1	507.2	326.9	260.8	400.9	97.6
All species	3,033.1	31.7	742.9	653.8	510.7	329.1	260.8	406.5	97.6

[1] Includes a small volume of other related species. See table 10.

Table 33.—*Total sawtimber volume in the Hill Country of Ohio, by species and diameter classes, 1967*

[In millions of board feet]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	51.4	21.9	17.2	7.1	3.8	—	—	1.4	—
Virginia pine	167.7	67.0	57.8	33.0	3.1	6.8	—	—	—
Other yellow pines	81.5	21.8	20.3	15.9	11.8	9.2	1.6	.9	—
Other softwoods	37.6	14.0	6.7	5.8	1.5	3.5	—	4.2	1.9
Total softwoods	338.2	124.7	102.0	61.8	20.2	19.5	1.6	6.5	1.9
Select white oaks	1,661.4	—	409.5	406.1	303.7	206.2	100.9	183.7	51.3
Select red oaks	804.2	—	132.8	120.5	123.0	108.3	86.2	195.4	38.0
Chestnut oaks [1]	811.4	—	228.4	195.5	155.2	90.3	64.3	73.9	3.8
Other red oaks	1,433.8	—	277.7	300.1	254.5	247.9	134.7	192.2	26.7
Hickory	804.7	—	297.3	214.7	142.3	75.1	39.9	35.4	—
Sugar maples	373.8	—	107.2	91.1	75.9	40.0	34.4	17.8	7.4
Soft maples	262.2	—	89.2	79.7	38.8	23.3	8.5	18.9	3.8
Beech	417.5	—	59.1	68.5	72.1	40.8	65.6	85.7	25.7
White ash [1]	389.2	—	123.7	87.3	73.6	38.0	34.1	29.9	2.6
Aspen [1]	66.4	—	27.4	26.6	2.9	1.3	1.3	6.9	—
Basswood	72.7	—	11.3	19.0	11.3	11.3	14.3	5.5	—
Yellow-poplar	1,017.5	—	213.4	236.4	216.3	128.6	81.2	125.2	16.4
Black walnut	200.4	—	70.4	46.2	45.2	16.1	13.1	9.4	—
Black cherry	187.6	—	74.5	58.2	30.6	8.1	9.1	7.1	—
Sycamore	210.2	—	28.6	35.5	30.7	33.4	13.2	44.5	24.3
Black locust	51.1	—	17.4	17.8	7.1	5.9	2.9	—	—
Elm	425.9	—	124.4	119.0	72.7	34.6	29.1	37.2	8.9
Sassafras	24.0	—	12.9	9.9	1.2	—	—	—	—
Other hardwoods	247.7	—	67.2	63.8	52.0	37.9	9.5	15.9	1.4
Total hardwoods	9,461.7	—	2,372.4	2,195.9	1,709.1	1,147.1	742.3	1,084.6	210.3
All species	9,799.9	124.7	2,474.4	2,257.7	1,729.3	1,166.6	743.9	1,091.1	212.2

[1] Includes a small volume of other closely related species. See table 10.

Table 34.—*Sampling errors for growing-stock and sawtimber volumes in the Hill Country of Ohio, by geographic units and species, 1967*

[In percent]

Species	Growing stock				Sawtimber			
	South-Central	South-eastern	East Central	Total	South-Central	South-eastern	East-Central	Total
White and red pine	46	*	*	39	—	*	*	*
Virginia pine	21	27	**	17	23	28	—	18
Other yellow pines	29	32	**	26	30	38	**	21
Other softwoods	37	*	*	39	*	**	*	46
Total softwoods	16	22	45	15	17	23	*	17
Select white oaks	7	7	11	4	8	8	12	5
Select red oaks	9	9	10	6	10	10	12	6
Chestnut oak	10	12	42	8	11	13	*	9
Other red oaks	7	8	12	5	8	9	12	5
Hickory	7	8	11	5	10	11	13	6
Sugar maple	13	13	16	8	16	15	18	10
Soft maples	16	17	13	9	21	23	17	12
Beech	21	15	17	10	23	17	19	12
White ash	12	15	15	8	15	17	19	10
Aspen	39	22	21	15	*	44	32	25
Basswood	28	34	41	21	30	39	49	26
Yellow-poplar	11	12	17	8	12	15	19	9
Black walnut	17	16	18	10	20	21	22	12
Black cherry	22	19	12	9	28	23	20	13
Sycamore	19	24	35	14	21	26	41	15
Black locust	18	29	26	16	35	36	38	24
Elm	13	14	11	8	17	18	13	10
Sassafras	23	33	20	15	35	*	*	26
Other hardwoods	10	16	16	8	14	18	19	10
Total hardwoods	2	2	3	1	3	3	4	2
All species	2	2	3	1	3	3	3	2

* Sampling areas of 50 to 99 percent.
** Sampling areas of more than 100 percent.

Table 35.—*Sawtimber volume in the South-Central Unit of Ohio, by species and log quality classes, 1967*

[In millions of board feet]

Species	All classes	Standard-lumber logs			Other [1]
		Grade 1	Grade 2	Grade 3	
White and red pine	—	—	—	—	—
Virginia pine	117.8	1.3	6.1	81.4	29.0
Other yellow pines	61.4	1.6	10.8	33.6	15.4
Other softwoods [2]	9.4	—	—	—	—
Total softwoods	188.6	2.9	16.9	115.0	44.4
Select white oaks	698.8	70.5	172.3	363.1	92.9
Select red oaks	294.8	55.4	77.6	129.0	32.8
Chestnut oak [3]	485.8	60.0	115.5	233.5	76.8
Other red oaks	588.1	84.1	105.6	304.2	94.2
Hickory	337.7	23.5	44.8	171.6	97.8
Sugar maple	143.5	11.3	22.7	84.3	25.2
Soft maples	85.5	3.5	8.6	48.7	24.7
Beech	85.7	1.3	7.9	51.9	24.6
White ash[3]	170.8	18.9	39.0	77.4	35.5
Aspen [3]	13.8	3.4	1.9	7.4	1.1
Basswood	24.5	1.9	7.1	12.7	2.8
Yellow-poplar	311.6	69.9	71.4	120.5	49.8
Black walnut	62.3	6.0	13.8	36.9	5.6
Black cherry	35.0	3.1	4.0	19.8	8.1
Sycamore	98.4	14.5	22.7	47.1	14.1
Black locust	9.3	—	.8	6.5	2.0
Elm	59.0	3.2	12.8	35.0	8.0
Sassafras	13.6	—	1.5	9.9	2.2
Other hardwoods	107.1	8.8	23.4	56.0	18.9
Total hardwoods	3,625.3	439.3	753.4	1,815.5	617.1

[1] For pines "Other" is grade 4; for hardwoods "Other" is tie-and-timber log grade.

[2] Species other than pine were not graded into standard-lumber log grade.

[3] Includes a small volume of other closely related species.

Table 36.—*Sawtimber volume in the Southeastern Unit of Ohio, by species and log quality classes, 1967*

[In millions of board feet]

Species	All classes	Standard-lumber logs			Other [1]
		Grade 1	Grade 2	Grade 3	
White and red pine	10.6	—	—	7.9	2.7
Virginia pine	49.3	—	1.2	37.1	11.0
Other yellow pines	18.5	1.0	4.3	9.0	4.2
Other softwoods [2]	1.4	—	—	—	—
Total softwoods	79.8	1.0	5.5	54.0	17.9
Select white oaks	579.9	44.7	156.1	278.6	100.5
Select red oaks	270.8	64.9	71.8	96.3	37.8
Chestnut oak [3]	241.4	22.6	64.4	114.2	40.2
Other red oaks	508.7	93.1	106.8	216.4	92.4
Hickory	214.1	7.9	31.5	104.4	70.3
Sugar maple	115.0	9.6	16.6	63.7	25.1
Soft maples	46.1	1.4	12.4	25.0	7.3
Beech	121.3	1.3	9.6	55.3	55.1
White ash [3]	80.7	9.1	20.1	34.2	17.3
Aspen [3]	14.4	—	2.7	8.5	3.2
Basswood	19.1	1.2	4.6	11.0	2.3
Yellow-poplar	338.1	81.5	82.8	122.9	50.9
Black walnut	68.7	3.4	16.0	42.2	7.1
Black cherry	28.1	2.7	5.2	14.2	6.0
Sycamore	66.4	14.1	20.5	23.7	8.1
Black locust	10.5	—	—	7.7	2.8
Elm	78.8	4.8	17.2	35.4	21.4
Sassafras	5.2	—	—	4.7	.5
Other hardwoods	65.8	7.8	14.0	31.7	12.3
Total hardwoods	2,873.1	370.1	652.3	1,290.1	560.6

[1] For pines "Other" is grade 4; for hardwoods "Other" is tie-and-timber log grade.

[2] Species other than pine were not graded into standard-lumber log grades.

[3] Includes a small volume of other closely related species.

Table 37.—*Sawtimber volume in the East-Central Unit of Ohio, by species and log quality classes, 1967*

[In millions of board feet]

Species	All classes	Standard-lumber logs			Other[1]
		Grade 1	Grade	Grade 3	
White and red pines	40.8	—	—	26.3	14.5
Virginia pine	.6	—	—	.4	.2
Other yellow pines	1.6	—	—	1.5	.1
Other softwoods [2]	26.8	—	—	—	—
Total softwoods	69.8	—	—	28.2	14.8
Select white oaks	382.7	46.1	95.6	187.0	54.0
Select red oaks	238.6	51.0	53.6	104.2	29.8
Chestnut oak [3]	84.2	7.7	28.4	36.4	11.7
Other red oaks	337.0	28.3	63.9	189.1	55.7
Hickory	252.9	18.0	38.8	98.6	97.5
Sugar maple	115.3	10.1	26.3	56.3	22.6
Soft maples	130.6	4.7	13.3	81.0	31.6
Beech	210.5	4.7	36.7	118.5	50.6
White ash [3]	137.7	12.8	30.4	62.8	31.7
Aspen [3]	38.2	—	5.4	23.5	9.3
Basswood	29.1	2.5	10.3	14.3	2.0
Yellow-poplar	367.8	58.6	59.5	156.2	93.5
Black walnut	69.4	3.4	8.3	45.2	12.5
Black cherry	124.5	3.5	5.5	72.7	42.8
Sycamore	45.4	14.0	10.7	17.4	3.3
Black locust	31.3	—	2.3	24.6	4.4
Elm	288.1	18.2	44.9	174.3	50.7
Sassafras	5.2	.7	.2	3.8	.5
Other hardwoods	74.8	8.1	16.6	39.1	11.0
Total hardwoods	2,963.3	292.4	550.7	1,505.0	615.2

[1] For pine "Other" is grade 4; for hardwoods "Other" is tie-and-timber log grade.

[2] Species other than pine were not graded into standard-lumber log grades.

[3] Includes a small volume of other closely related species.

Table 38.—*Total sawtimber volume in the Hill Country of Ohio, by species and log quality classes, 1967*

[In millions of board feet]

Species	All classes	Standard-lumber logs			Other [1]
		Grade 1	Grade 2	Grade 3	
White and red pine	51.4	—	—	34.2	17.2
Virginia pine	167.7	1.3	7.3	118.9	40.2
Other yellow pines	81.5	2.6	15.1	44.1	19.7
Other softwoods [2]	37.6	—	—	—	—
Total softwoods	338.2	3.9	22.4	197.2	77.1
Select white oaks	1,661.4	161.3	424.0	828.7	247.4
Select red oaks	804.2	171.3	203.0	329.5	100.4
Chestnut oak [3]	811.4	90.3	208.3	384.1	128.7
Other red oaks	1,433.8	205.5	276.3	709.7	242.3
Hickory	804.7	49.4	115.1	374.6	265.6
Sugar maple	373.8	31.0	65.6	204.3	72.9
Soft maples	262.2	9.6	34.3	154.7	63.6
Beech	417.5	7.3	54.2	225.7	130.3
White ash [3]	389.2	40.8	89.5	174.4	84.5
Aspen [3]	66.4	3.4	10.0	39.4	13.6
Basswood	72.7	5.6	22.0	38.0	7.1
Yellow-poplar	1,017.5	210.0	213.7	399.6	194.2
Black walnut	200.4	12.8	38.1	124.3	25.2
Black cherry	187.6	9.3	14.7	106.7	56.9
Sycamore	210.2	42.6	53.9	88.2	25.5
Black locust	51.1	—	3.1	38.8	9-2
Elm	425.9	26.2	74.9	244.7	80.1
Sassafras	24.0	.7	1.7	18.4	3.2
Other hardwoods	247.7	24.7	54.0	126.8	42.2
Total hardwoods	9,461.7	1,101.8	1,956.4	4,610.6	1,792.9

[1] For pine "Other" is grade 4; for hardwoods "Other" is tie-and-timber log grade.

[2] Species other than pine were not graded into standard-lumber log grades.

[3] Includes a small volume of other closely related species.

Table 39.—*Net annual growth of growing stock on commercial forest land in the Hill Country of Ohio, by species and geographic units, 1966*[1]

[In thousands, of cubic feet]

Species	South-Central	South-eastern	East-Central	Total
White and red pine	42	240	578	860
Virginia pine	1,603	299	19	1,921
Other yellow pines	567	187	209	963
Other softwoods	104	65	287	456
Total softwoods	2,316	791	1,093	4,200
Select white oaks	8,122	4,113	3,696	15,931
Select red oaks	1,794	1,247	1,821	4,862
Chestnut oak	3,569	1,735	437	5,741
Other white oaks	52	—	59	111
Other red oaks	7,031	3,451	3,363	13,845
Hickory	4,112	1,955	2,084	8,151
Sugar maple	1,670	1,725	1,609	5,004
Soft maple	1,553	882	1,688	4,123
Beech	211	405	585	1,201
White ash	1,992	763	1,473	4,228
Aspen	124	329	570	1,023
Basswood	202	116	210	528
Yellow-poplar	2,848	4,223	5,296	12,367
Black walnut	977	717	1,981	3,675
Black cherry	597	385	2,800	3,782
Sycamore	904	624	161	1,689
Elm	1,266	1,152	3,729	6,147
Other hardwoods	2,849	1,163	3,134	7,146
Total hardwoods	39,873	24,985	34,696	99,554
All species	42,189	25,776	35,789	103,754

[1] Based on average net annual growth of growing stock, 1952-66.

Table 40.—*Timber removals from growing stock on commercial forest land in the Hill Country of Ohio, by species groups and geographic units, 1966*[1]

[In thousands of cubic feet]

Species	South-Central	South-eastern	East-Central	Total
Softwoods [2]	1,637	512	551	2,700
Select white oaks	2,282	1,817	496	4,595
Select red oaks	1,307	793	1,129	3,229
Chestnut oak [3]	3,882	300	531	4,713
Other red oaks	3,406	2,957	2,479	8,842
Hickory	1,340	353	277	1,970
Other hardwoods [4]	1,885	1,666	1,794	5,345
Soft hardwoods [5]	4,483	1,595	4,176	10,254
Total hardwoods	18,585	9,481	10,882	38,948
All species	20,222	9,993	11,433	41,648

[1] Based on average net annual growing-stock removals, 1952-66.
[2] Mostly yellow pines.
[3] Includes a small volume of other white oaks.
[4] Includes ash, beech, birch, black walnut, buckeye, hackberry, locust, sugar maple, and willow.
[5] Includes aspen, basswood, cherry, cottonwood, dogwood, elm, gum, soft maples, sycamore, and yellow-poplar.

Table 41.—*Net annual growth of sawtimber on commercial forest land in the Hill Country of Ohio, by species and geographic units, 1966*[1]

[In thousands of board feet]

Species	South-Central	South-eastern	East-Central	Total
White and red pine	—	313	1,335	1,648
Virginia pine	6,537	1,866	23	8,426
Other yellow pines	2,016	420	48	2,484
Other softwood	370	34	1,038	1,442
Total softwoods	8,923	2,633	2,444	14,000
Select white oaks	28,949	15,478	15,850	60,277
Select red oaks	6,716	5,776	7,188	19,680
Chestnut oak	12,073	7,633	1,808	21,514
Other white oaks	395	—	—	395
Other red oaks	24,136	12,343	11,474	47,953
Hickory	13,930	5,195	6,887	26,012
Sugar maple	5,634	2,959	4,142	12,735
Soft maple	4,771	2,485	4,613	11,869
Beech	1,144	2,372	3,044	6,560
White ash	4,429	1,860	1,945	8,234
Aspen	384	682	1,599	2,665
Basswood	627	301	707	1,635
Yellow-poplar	12,097	17,039	23,334	52,470
Black walnut	3,779	3,624	3,243	10,646
Black cherry	1,359	1,091	6,929	9,379
Sycamore	4,462	2,819	726	8,007
Elm	1,382	2,294	6,339	10,015
Other hardwoods	6,389	3,163	7,266	16,818
Total hardwoods	132,656	87,114	107,094	326,864
All species	141,579	89,747	109,538	340,864

[1] Based on average net annual growth of sawtimber, 1952-66.

Table 42.—*Timber removals from sawtimber on commercial forest land in the Hill Country of Ohio, by species groups and geographic units, 1966*[1]

[In thousands of board feet]

Species	South-Central	South-eastern	East-Central	Total
Softwoods [2]	7,577	2,372	2,551	12,500
Select white oaks	5,761	7,180	1,634	14,575
Select red oaks	2,647	2,742	5,757	11,146
Chestnut oak [3]	10,117	367	1,666	12,150
Other red oaks	9,055	12,878	10,097	32,030
Hickory	1,622	1,381	899	3,902
Other hard hardwoods [4]	4,751	5,088	5,950	15,789
Soft hardwoods [5]	17,700	2,550	8,896	29,146
Total hardwoods	51,653	32,186	34,899	118,738
All species	59,230	34,558	37,450	131,238

[1] Based on average annual sawtimber removals, 1952-66.
[2] Mostly yellow pines.
[3] Includes a small volume of other white oaks.
[4] Includes ash, beech, birch, black walnut, buckeye, hackberry, locust, sugar maple and willow.
[5] Includes aspen, basswood, cherry, cottonwood, dogwood, elm, gum, soft maples, sycamore, and yellow-poplar.

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PULPWOOD PRODUCTION in the Northeast 1968

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by James T. Bones
and Neal P. Kingsley

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1969
NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
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RICHARD D. LANE, DIRECTOR

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PULPWOOD PRODUCTION in the Northeast 1968

Cover photo credit—N.Y.S. Conservation Department.

Background

THIS REPORT is based on a canvass of all pulpmills in the Northeast that use wood—either round wood or chips—as a basic raw material for a variety of products. Mills that use woodpulp as a raw material for insulation board and hardboard were also included in the canvass. However, the canvass did not include mills that use waste paper, rags, or pulping material other than wood. And it did not include hardboard plants that impregnate wood flour, flakes, or chips with glues or resins in manufacturing their products.

The roundwood production statistics reported in this bulletin are based upon pulpmill receipts, so they are subject to fluctuations caused by uneven wood-inventory buildups or liquidations from year to year. The wood-chip production and receipt statistics are mostly for chipped plant byproducts received at the pulpmill, but may also include small amounts of chipped roundwood. This year the chip statistics also include for the first time "other wood-industry byproducts"; and where comparisons have been made, the statistics from previous years have been adjusted to include this category of material.

Pulpwood Production Declines

Pulpwood production in the Northeast in 1968 decreased slightly more than 1 percent from the 1967 record high of over 6 million cords. This modest decrease was due mainly to a slackening in roundwood production. Total pulpwood production in the 14 Northeastern States[1] amounted to 5,961,600 cords in 1968. This is 62,000 cords less than the 1967 total of 6,023,600 cords (fig. 1).

This 1-percent decrease is the first one experienced since these annual canvasses were begun in 1963. It no doubt is an extension of the production slowdown mentioned in the 1967 pulpwood report.

Receipts of pulpwood at northeastern woodpulp mills totaled 6,311,300 cords in 1968. Of this, 3,514,900 cords came from softwood trees and 2,796,400 cords from hardwood trees (table 2). Thus, total receipts exceeded total production by

[1] Connecticut, Delaware, Kentucky, Maine, Maryland, Massahusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia.

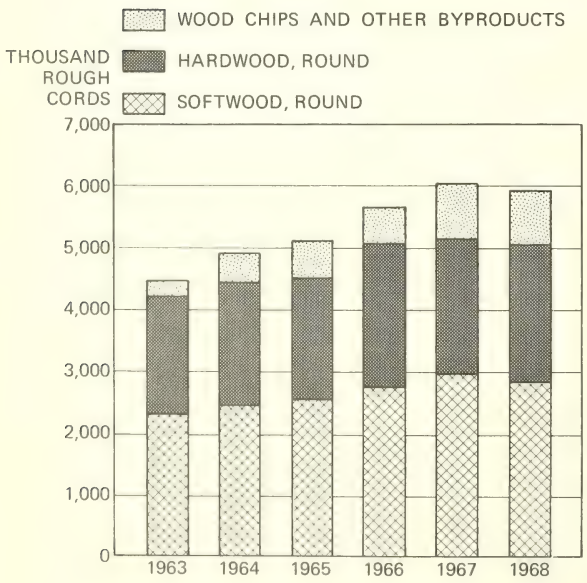

Figure 1.—Total pulpwood production in the 14 states of the Northeast, 1963-68.

349,700 cords. Five of the 14 states (Connecticut, Delaware, Kentucky, Vermont, and West Virginia) produced more wood than they received. Delaware and West Virginia had no operating woodpulp mills, while Vermont, Kentucky, and Connecticut each had one.

Production and receipts of hardwood pulpwood are more or less in balance in the Northeastern States. Most of the region's pulpwood production deficit was made up by softwood shipments from Canada.

Round Pulpwood Down More Than 5 Percent

The production of round pulpwood decreased 292,400 cords—about 5.5 percent—under that of 1967. In 1968 round pulpwood production in the Northeast totaled 5,020,900 cords, compared with 5,313,300 cords in 1967. This 1967-68 decrease compares with a 3-percent gain between 1966 and 1967, and a 12-percent 1965-66 gain.

Round pulpwood receipts by woodpulp mills in the Northeast totaled 5,364,000 cords in 1968 (table 5). Receipts exceeded roundwood production by 343,100 cords—a 7 percent surplus.

This year's round pulpwood production was up from 1967 in only two states — Maryland and New Hampshire. Delaware, New York, Ohio, Pennsylvania, and West Virginia registered production losses of over 10 percent.

Seventeen Counties Top 50 Thousand Cord Mark

Seventeen counties in seven states produced over 50 thousand cords of roundwood pulpwood in 1968. This is a 3-county drop from the 20-county total of 1967. Garrett County, Maryland, was restored to the list of high producers after having fallen below the 50 thousand cord production level in 1967. Centre and Huntingdon Counties in Pennsylvania and Essex County, New York, fell below the 50 thousand cord mark in 1968.

Counties that produced over 50 thousand cords of roundwood pulpwood in 1968 are listed below:

County and State	*Thousand Cords*
1. Aroostook, Maine	536.1
2. Piscataquis, Maine	439.4
3. Penobscot, Maine	375.4
4. Washington, Maine	339.4
5. Somerset, Maine	334.0
6. Oxford, Maine	222.5
7. Coos, New Hampshire	178.4
8. Franklin, Maine	142.3
9. Sussex, Delaware	76.6
10. Waldo, Maine	73.1
11. Clearfield, Pennsylvania	65.2
12. Essex, Vermont	63.3
13. Lincoln, Maine	59.7
14. Hancock, Maine	55.6
15. Kennebec, Maine	55.5
16. Hampshire, West Virginia	51.5
17. Garrett, Maryland**	50.4

**County did not produce over 50 thousands cords in 1967 but has in other years.

Wood Chip Production Gains Over 32 Percent

The production of pulpwood chips, which are primarily produced from sawmill byproducts, rose from 710,300 cords in 1967 to 940,000 cords in 1968. These figures also include wood reported as "other wood-industry byproducts" in previous reports. They have been included with pulpwood chips for two reasons: first, this material generally constitutes only a small portion of all pulpwood produced; second, investigation has revealed that a substantial portion of this material is received by pulpmills as chips but is reported as other byproducts.

In addition to sawmill and other byproducts, increasing volumes of logs and tree-length material are being chipped for shipment to pulpmills. Some of this material may be low-quality sawlogs that are chipped rather than sawed, but some may be roundwood that is chipped before being shippped to the mill. Though at present such material constitutes only a fraction of the total chip production, considerable interest has been generated in the economics of this type of wood handling, and it may play an important role in the future.

Softwood chip production scored a comeback after declining in both 1966 and 1967. Production jumped from 189,300 cords in

1967 to 332,000 cords in 1968, a 75 percent increase. Although hardwood chip production increased 17 percent between 1967 and 1968, this represented a slowing down of hardwood chip production growth, which registered a 44 percent gain in the preceding year.

In the 5 years between 1963 and 1968, chip production from the 14 Northeastern States has grown from 340,800 cords to 940,700 cords. This represents a gain in percent of total production of from 7 percent in 1963 to nearly 16 percent in 1968.

A Glimpse at the Industry

One measure of the woodpulp industry's growth rate can be made by comparing its installed daily pulping capacity over the years. The following tabulation shows the change in the pulping capacities of active mills in the Northeast for the 10-year period between 1955 and 1965, and the three years between 1965 and 1968.

State	*1955 (tons/24 hours)*	*1965 (tons/24 hours)*	*Change (percent)*	*1968 (tons/24 hours)*	*Change (percent)*
Connecticut	20	30	+50	35	+17
Kentucky	—	—	—	(*)	—
Maine	4,366	6,725	+54	7,607	+13
Maryland	475	680	+43	989	+45
Massachusetts	115	50	−57	50	0
New Hampshire	1,110	890	−20	1,215	+37
New Jersey	563	345	−39	442	+28
New York	2,488	1,915	−23	2,085	+9
Ohio	310	1,225	+295	1,450	+18
Pennsylvania	1,163	1,830	+57	2,102	+15
Rhode Island	250	250	0	250	0
Vermont	105	85	−19	44	−48
All states	10,965	14,025	+28	16,269	+16

Source: Woodpulp Mills in the United States, 1955 and 1965, and Lockwood's Directory of Paper and Allied Trades, 1969.
*A new mill of unknown capacity operated during 1968.

Delaware and West Virginia are not included because they have no active woodpulp mills.

Pulpmill capacity in the Northeast has been growing at an accelerated rate in the last 3 years. Between 1955 and 1965 daily

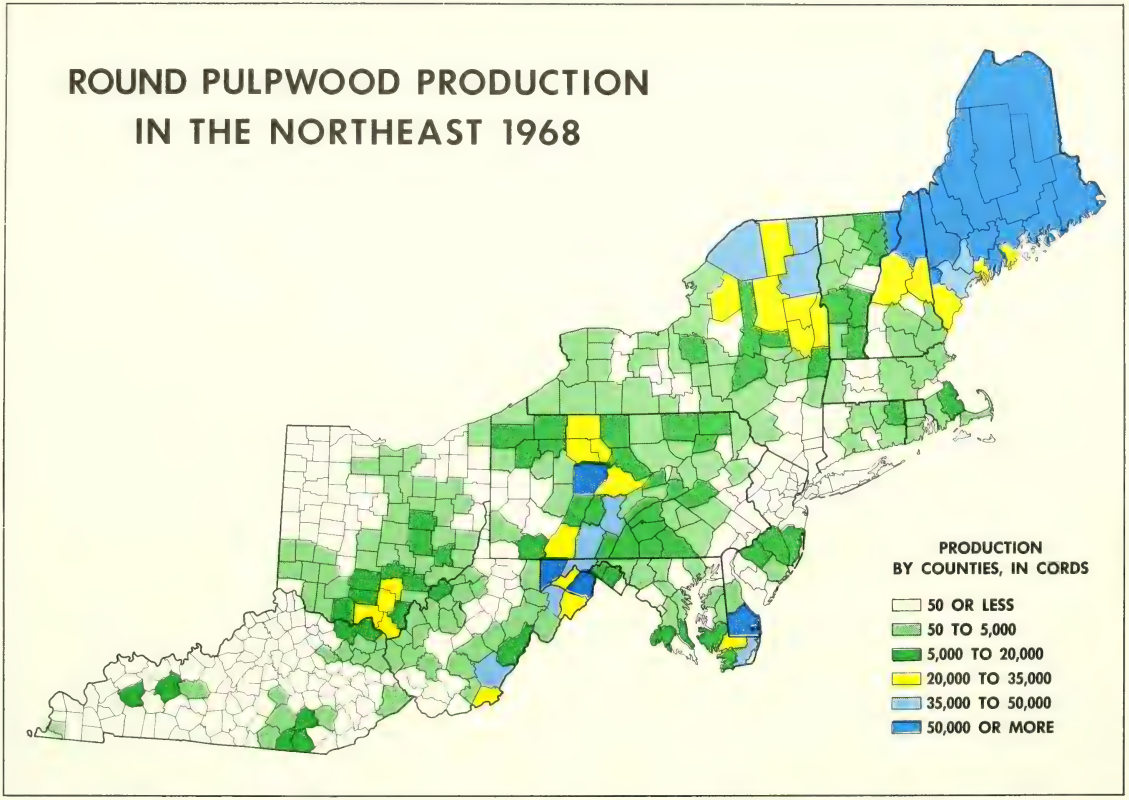

Figure 2.—The geographical pattern of round pulpwood production in the Northeast, 1968.

pulping capacity increased only 2.8 percent per year, while the 1965-68 period showed a 5.3 percent per year increase.

Nine of the 14 states have added to their installed daily capacity. Maryland and Ohio have shown the highest sustained rates over the 13-year period.

In the past 3 years, four older mills have been closed and dismantled, while four new ones have been built and are now operating. Probably more significant is the fact that 12 established mills have changed ownership. This type of consolidation has been occurring throughout the pulp industry in the United States.

At year's end eight new mill and mill-expansion projects were under way in the Northeast. Kentucky is scheduled for two new mills by 1970. Two Pennsylvania mills are expanding and increasing their capacities, and four New York mills are expanding or modernizing their existing plants.

■

Table 1.—*Total production of pulpwood in the Northeast, by sources and states, 1968*

[In thousands of rough cords][1]

State	Source[2]		
	From roundwood	From chips	All sources
Connecticut	13.7	—	13.7
Delaware	78.1	—	78.1
Kentucky	82.9	94.2	177.1
Maine	2,798.5	210.1	3,008.6
Maryland	217.3	98.6	315.9
Massachusetts	19.9	9.2	29.1
New Hampshire	249.9	85.6	335.5
New Jersey	45.2	1.8	47.0
New York	339.4	100.7	440.1
Ohio	232.6	33.5	266.1
Pennsylvania	526.8	159.0	685.8
Rhode Island	7.7	—	7.7
Vermont	120.8	28.6	149.4
West Virginia	288.1	119.4	407.5
All states	5,020.9	940.7	5,961.6

[1] 128 cubic feet of wood, bark, and airspace.
[2] Based upon form in which wood is received at the pulpmill.

Table 2.—*Total production and receipts of pulpwood in the Northeast, by states and species groups, 1968*

[In thousands of rough cords]

State	Total production		Total receipts		Production surplus (+) or deficit (—)
	Softwood	Hardwood	Softwood	Hardwood	
Connecticut	6.6	7.1	(D)	(D)	+(D)
Delaware	74.9	3.2	—	—	+78.1
Kentucky	29.9	147.2	(D)	(D)	+(D)
Maine	2,331.8	676.8	2,622.5	701.8	—315.7
Maryland	195.3	120.6	121.6	291.8	—97.5
Massachusetts	13.1	16.0	(D)	(D)	—(D)
New Hampshire	154.9	180.6	242.5	272.5	—179.5
New Jersey	39.6	7.4	53.4	13.3	—19.7
New York	95.4	344.7	183.8	427.0	—170.7
Ohio	5.7	260.4	.8	363.9	—98.6
Pennsylvania	69.8	616.0	248.6	616.3	—179.1
Rhode Island	4.6	3.1	(D)	(D)	—(D)
Vermont	89.9	59.5	(D)	(D)	+(D)
West Virginia	78.1	329.4	—	—	+407.5
All states	3,189.6	2,772.0	3,514.9	2,796.4	—349.7

(D) Withheld to avoid disclosing data for individual mills.

Table 3.—*Round pulpwood production in the Northeast, by states and species groups, 1968*

[In thousands of rough cords]

State	Softwood				Hardwood				Total production
	Cut and retained in state	Shipped to other states		Total softwood	Cut and retained in state	Shipped to other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.2	3.4	—	6.6	—	7.1	—	7.1	13.7
Delaware	—	26.0	48.9	74.9	—	3.2	—	3.2	78.1
Kentucky	—	1.5	25.0	26.5	6.6	29.7	20.1	56.4	82.9
Maine	2,124.6	27.7	—	2,152.3	599.6	46.6	—	646.2	2,798.5
Maryland	12.9	17.8	98.6	129.3	80.2	7.8	(*)	88.0	217.3
Massachusetts	—	13.1	—	13.1	1.1	5.7	—	6.8	19.9
New Hampshire	81.6	11.2	—	92.8	132.0	25.1	—	157.1	249.9
New Jersey	38.4	.3	—	38.7	6.4	.1	—	6.5	45.2
New York	87.2	2.0	5.0	94.2	227.7	3.8	13.7	245.2	339.4
Ohio	.5	5.2	—	5.7	225.1	.7	1.1	226.9	232.6
Pennsylvania	61.8	2.5	—	64.3	418.4	44.1	—	462.5	526.8
Rhode Island	4.6	—	—	4.6	3.1	—	—	3.1	7.7
Vermont	11.4	71.8	—	83.2	—	37.6	—	37.6	120.8
West Virginia	—	7.6	63.8	71.4	—	70.9	145.8	216.7	288.1
All states	2,426.2	190.1	241.3	2,857.6	1,700.2	282.4	180.7	2,163.3	5,020.9

* Less than 50 cords.

Table 4.—*Pulpwood chip production in the Northeast, by states and species groups, 1968*[1]

[In thousands of rough cord equivalents]

State[2]	Softwood				Hardwood				Total production
	Produced and retained in state	Shipped to other states		Total softwood	produced and retained in state	Shipped to other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Kentucky	—	0.2	3.2	3.4	33.5	15.0	42.3	90.8	94.2
Maine	167.7	11.8	—	179.5	25.7	4.9	—	30.6	210.1
Maryland	(*)	36.9	29.1	66.0	6.5	26.1	—	32.6	98.6
Massachusetts	—	—	—	—	1.2	8.0	—	9.2	9.2
New Hampshire	47.7	14.4	—	62.1	22.6	0.9	—	23.5	85.6
New Jersey	.9	—	—	.9	.9	—	—	.9	1.8
New York	1.1	.1	—	1.2	76.7	14.5	8.3	99.5	100.7
Ohio	—	—	—	—	33.5	(*)	—	33.5	33.5
Pennsylvania	5.3	.2	—	5.5	134.8	18.7	—	153.5	159.0
Vermont	—	6.7	—	6.7	—	21.9	—	21.9	28.6
West Virginia	—	2.9	3.8	6.7	—	70.1	42.6	112.7	119.4
All states	222.7	73.2	36.1	332.0	335.4	180.1	93.2	608.7	940.7

[1] Includes sawmill slabs and edgings, veneer cores, and post and pole trimmings.
[2] States with no production are omitted.
* Less than 50 cords.

Table 5.—*Round pulpwood receipts in the Northeast, by states and species groups, 1968*

[In thousands of rough cords]

State	Softwood				Hardwood				Total receipts
	Cut and retained in state	Receipts from other states		Total softwood	Cut and retained in state	Receipts from other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.2	(D)	—	(D)	—	(D)	(D)	(D)	(D)
Delaware	—	—	—	—	—	—	—	—	—
Kentucky	—	(D)	—	(D)	6.6	(D)	(D)	(D)	(D)
Maine	2,124.6	9.6	267.6	2,401.8	599.6	14.8	47.5	661.9	3,063.7
Maryland	12.9	53.4	52.2	118.5	80.2	158.2	5.8	244.2	362.7
Massachusetts	—	(D)	—	(D)	1.1	(D)	—	(D)	(D)
New Hampshire	81.6	57.8	20.3	159.7	132.0	69.4	25.3	226.7	386.4
New Jersey	38.4	—	—	38.4	6.4	—	—	6.4	44.8
New York	87.2	39.9	55.1	182.2	227.7	21.9	64.1	313.7	495.9
Ohio	.5	—	.1	.6	225.1	39.9	6.8	271.8	272.4
Pennsylvania	61.8	65.7	75.3	202.8	418.8	15.2	17.1	450.7	653.5
Rhode Island	4.6	(D)	—	(D)	3.1	(D)	—	(D)	(D)
Vermont	11.4	(D)	—	(D)	—	(D)	—	(D)	(D)
West Virginia	—	—	—	—	—	—	—	—	—
All states	2,426.2	248.9	470.6	3,145.7	1,700.2	343.2	174.9	2,218.3	5,364.0

(D) Withheld to avoid disclosing data for individual mills.

Table 6.—*Pulpwood chip receipts in the Northeast, by states and species groups, 1968*[1]

[In thousands of rough cord equivalents]

State[2]	Softwood				Hardwood				Total receipts
	Produced and retained in state	Receipts from other states		Total softwood	Produced and retained in state	Receipts from other states		Total hardwood	
		In the Northeast	Outside the Northeast			In the Northeast	Outside the Northeast		
Kentucky	—	—	—	—	(D)	(D)	(D)	(D)	(D)
Maine	167.7	14.4	38.6	220.7	25.7	0.9	13.3	39.9	260.6
Maryland	(*)	3.1	—	3.1	6.5	39.9	1.2	47.6	50.7
Massachusetts	—	—	—	—	(D)	(D)	(D)	(D)	(D)
New Hampshire	47.7	18.5	16.6	82.8	22.6	11.7	11.5	45.8	128.6
New Jersey	.9	14.1	—	15.0	.9	6.0	—	6.9	21.9
New York	1.1	—	.5	1.6	76.7	25.4	11.2	113.3	114.9
Ohio	—	.2	—	.2	33.5	58.6	—	92.1	92.3
Pennsylvania	5.3	24.7	15.8	45.8	134.8	30.7	.1	165.6	211.4
All states	222.7	75.0	71.5	369.2	335.4	179.4	63.3	578.1	947.3

[1] Includes sawmill slabs and edgings, veneer cores, and post and pole trimmings.
[2] States with no receipts are omitted.
(D) Withheld to avoid disclosing data for individual mills.
* Less than 50 cords.

Table 7.—Round pulpwood receipts from states, outside the Northeast, by state (or province) of origin and species groups, 1968

[In thousands of rough cords]

Receiving state[1]	State (or province) of origin	Total softwood	Total hardwood	All species
Kentucky	Indiana	—	0.1	0.1
	Tennessee	—	8.2	8.2
Maine	New Brunswick	252.7	38.8	291.5
	Quebec	15.0	8.6	23.6
Maryland	Virginia	52.2	5.8	58.0
	New Brunswick	3.2	—	3.2
New Hampshire	Quebec	17.1	25.4	42.5
New York	Ontario	1.6	29.3	30.9
	Quebec	53.5	34.8	88.3
Ohio	Indiana	.1	1.9	2.0
	Tennessee	—	.3	.3
	Virginia	—	4.5	4.5
Pennsylvania	Ontario	62.4	—	62.4
	Virginia	12.9	3.0	15.9
Vermont	Quebec	6.0	—	6.0
All states	—	476.7	160.7	637.4

[1] States with no receipts are omitted.

Table 8.—Pulpwood chip receipts from outside the Northeast, by state (or province) of origin and species groups, 1968

[In thousands of rough cord equivalents]

Receiving state[1]	State (or province) of origin	Total softwood	Total hardwood	All species
Kentucky	Indiana	—	6.8	6.8
	Tennessee	—	19.2	19.2
Maine	New Brunswick	14.9	13.3	28.2
	Quebec	23.8	—	23.8
Maryland	Virginia	—	1.1	1.1
New Hampshire	Quebec	16.6	11.5	28.1
New York	New Brunswick	.2	—	.2
	Ontario	(*)	4.0	4.0
	Quebec	.3	7.2	7.5
Pennsylvania	Virginia	15.8	.1	15.9
All states	—	71.6	63.2	134.8

[1] States with no receipts are omitted.
* Less than 50 cords.

Table 9.—*Round pulpwood production in the Northeast, by states and species groups, 1968*

[In thousands of rough cords]

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods[1]	Total	
Connecticut	—	—	6.6	6.6	—	2.8	4.3	7.1	13.7
Delaware	—	—	74.9	74.9	—	(*)	3.2	3.2	78.1
Kentucky	(*)	(*)	26.5	26.5	1.6	38.4	16.4	56.4	82.9
Maine	1,727.3	293.8	131.2	2,152.3	60.5	37.5	548.2	646.2	2,798.5
Maryland	.3	.5	128.5	129.3	9.4	40.2	38.4	88.0	217.3
Massachusetts	—	—	13.1	13.1	(*)	2.2	4.6	6.8	19.9
New Hampshire	75.2	9.1	8.5	92.8	1.1	—	156.0	157.1	249.9
New Jersey	—	—	38.7	38.7	—	—	6.5	6.5	45.2
New York	55.8	11.3	27.1	94.2	21.1	5.2	218.9	245.2	339.4
Ohio	.2	.2	5.3	5.7	5.8	202.5	18.6	226.9	232.6
Pennsylvania	.2	6.8	57.3	64.3	29.9	180.6	252.0	462.5	526.8
Rhode Island	—	—	4.6	4.6	—	2.2	.9	3.1	7.7
Vermont	77.3	2.2	3.7	83.2	2.3	(*)	35.3	37.6	120.8
West Virginia	9.0	5.5	56.9	71.4	20.0	137.9	58.8	216.7	288.1
All states	1,945.3	329.4	582.9	2,857.6	151.7	649.5	1,362.1	2,163.3	5,020.9

[1]Chiefly maple species, beech, gums, elms, and birch species.
*Less than 50 cords.

Table 10.—*Round pulpwood production in Southern New England, by states and counties and species groups, 1968*

[In thousands of rough cords]

State and county[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Connecticut	—	—	6.6	6.6	—	2.8	4.3	7.1	13.7
Hartford	—	—	2.4	2.4	—	—	—	—	2.4
New London	—	—	.8	.8	—	.4	2.8	3.2	4.0
Windham	—	—	2.1	2.1	—	2.3	1.5	3.8	5.9
All others	—	—	1.3	1.3	—	.1	—	.1	1.4
Massachusetts	—	—	13.1	13.1	(*)	2.2	4.6	6.8	19.9
Berkshire	—	—	—	—	(*)	—	1.0	1.0	1.0
Bristol	—	—	3.0	3.0	—	.6	.6	1.2	4.2
Plymouth	—	—	9.7	9.7	—	1.6	1.9	3.5	13.2
All others	—	—	.4	.4	—	(*)	1.1	1.1	1.5
Rhode Island	—	—	4.6	4.6	—	2.2	.9	3.1	7.7
Kent	—	—	1.5	1.5	—	1.3	.4	1.7	3.2
Providence	—	—	2.5	2.5	—	.5	.3	.8	3.3
Washington	—	—	.6	.6	—	.4	.2	.6	1.2

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 11.—*Round pulpwood production in Delaware and New Jersey, by counties and species groups, 1968*

[In thousands of rough cords]

State and county[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Delaware	—	—	74.9	74.9	—	(*)	3.2	3.2	78.1
Kent	—	—	1.5	1.5	—	—	(*)	(*)	1.5
Sussex	—	—	73.4	73.4	—	(*)	3.2	3.2	76.6
New Jersey	—	—	38.7	38.7	—	—	6.5	6.5	45.2
Atlantic	—	—	6.5	6.5	—	—	.3	.3	6.8
Burlington	—	—	12.6	12.6	—	—	3.1	3.1	15.7
Camden	—	—	8.5	8.5	—	—	1.3	1.3	9.8
Gloucester	—	—	4.1	4.1	—	—	1.8	1.8	5.9
Ocean	—	—	7.0	7.0	—	—	—	—	7.0
Warren	—	—	—	—	—	—	(*)	(*)	(*)

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 12.—*Round pulpwood production in Kentucky, by counties and species groups, 1968*

[In thousands of rough cords]

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Bath	(*)	(*)	0.6	0.6	—	—	0.6	0.6	1.2
Boyd	(*)	(*)	.2	.2	—	—	.1	.1	.3
Carter	—	—	(*)	(*)	—	1.3	—	1.3	1.3
Clay	—	—	—	—	(*)	.1	(*)	.1	.1
Daviess	—	—	—	—	—	—	(*)	(*)	(*)
Elliott	—	—	—	—	—	.3	—	.3	.3
Grayson	—	—	—	—	0.1	.2	(*)	.3	.3
Greenup	—	—	—	—	—	11.1	—	11.1	11.1
Hickman	—	—	—	—	—	—	1.1	1.1	1.1
Hopkins	—	—	—	—	1.1	4.3	3.2	8.6	8.6
Laurel	—	—	6.6	6.6	—	2.7	.8	3.5	10.1
Lawrence	(*)	(*)	.2	.2	—	(*)	—	(*)	.2
Lewis	—	—	—	—	—	7.4	—	7.4	7.4
Lincoln	—	—	.3	.3	.1	3.2	.4	3.7	4.0
McCreary	—	—	5.2	5.2	.3	2.8	2.3	5.4	10.6
Ohio	—	—	—	—	—	—	6.6	6.6	6.6
Pike	—	—	—	—	(*)	.2	(*)	.2	.2
Pulaski	—	—	.9	.9	—	—	—	—	.9
Rowan	(*)	(*)	2.9	2.9	—	1.5	.3	1.8	4.7
Wayne	—	—	1.6	1.6	—	—	—	—	1.6
Whitley	—	—	8.0	8.0	(*)	3.3	1.0	4.3	12.3
Total	(*)	(*)	26.5	26.5	1.6	38.4	16.4	56.4	82.9

[1] Counties with no production are omitted.

* Less than 50 cords.

Table 13.—*Round pulpwood production in Maine, by counties and species groups, 1968*

[In thousands of rough cords]

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Androscoggin	3.9	4.2	18.9	27.0	0.1	1.1	20.1	21.3	48.3
Aroostook	460.0	20.1	.1	480.2	39.0	1.7	15.2	55.9	536.1
Cumberland	4.0	3.7	9.7	17.4	.1	1.7	25.5	27.3	44.7
Franklin	62.7	7.0	5.8	75.5	(*)	3.6	63.2	66.8	142.3
Hancock	44.5	3.9	2.5	50.9	—	1.5	3.2	4.7	55.6
Kennebec	6.4	6.0	15.3	27.7	(*)	1.8	26.0	27.8	55.5
Knox	15.5	2.3	3.6	21.4	—	.4	7.0	7.4	28.8
Lincoln	20.6	4.4	15.6	40.6	.1	1.0	18.0	19.1	59.7
Oxford	43.9	21.2	17.7	82.8	.7	7.0	132.0	139.7	222.5
Penobscot	188.9	69.2	1.9	260.0	15.4	6.2	93.8	115.4	375.4
Piscataquis	366.9	22.0	3.3	392.2	5.0	2.9	39.3	47.2	439.4
Sagadahoc	3.2	2.2	10.3	15.7	(*)	.5	5.6	6.1	21.8
Somerset	278.4	11.0	6.4	295.8	—	3.4	34.8	38.2	334.0
Waldo	23.6	11.5	7.8	42.9	(*)	2.0	28.2	30.2	73.1
Washington	203.3	103.9	8.2	315.4	.1	1.8	22.1	24.0	339.4
York	1.5	1.2	4.1	6.8	(*)	.9	14.2	15.1	21.9
Total	1,727.3	293.8	131.2	2,152.3	60.5	37.5	548.2	646.2	2,798.5

* Less than 50 cords.

Table 14.—*Round pulpwood production in Maryland, by counties and species groups, 1968*

[In thousands of rough cords]

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Allegany	0.1	0.2	2.5	2.8	3.8	15.3	15.0	34.1	36.9
Anne Arundel	(*)	(*)	2.3	2.3	—	(*)	—	(*)	2.3
Baltimore	—	—	.1	.1	—	.2	.1	.3	.4
Calvert	.1	.1	4.8	5.0	(*)	(*)	.1	.1	5.1
Caroline	—	—	4.1	4.1	—	(*)	(*)	(*)	4.1
Carroll	—	—	.6	.6	—	.3	.1	.4	1.0
Cecil	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Charles	—	—	6.5	6.5	(*)	(*)	.3	.3	6.8
Dorchester	—	—	15.4	15.4	—	.2	—	.2	15.6
Frederick	—	—	—	—	(*)	.2	.2	.4	.4
Garrett	.1	.2	1.9	2.2	5.6	21.4	21.3	48.3	50.5
Harford	—	—	(*)	(*)	—	.1	(*)	.1	.1
Howard	—	—	.1	.1	—	.1	(*)	.1	.2
Kent	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Montgomery	—	—	(*)	(*)	—	—	—	—	(*)
Prince Georges	—	—	2.3	2.3	—	.2	.3	.5	2.8
Queen Annes	—	—	.1	.1	—	—	(*)	(*)	.1
Somerset	—	—	16.8	16.8	—	—	(*)	(*)	16.8
Talbot	—	—	(*)	(*)	—	—	—	—	(*)
Washington	(*)	(*)	1.2	1.2	(*)	1.8	.9	2.7	3.9
Wicomico	—	—	32.5	32.5	—	.2	.1	.3	32.8
Worcester	—	—	37.3	37.3	—	.2	(*)	.2	37.5
Total	0.3	0.5	128.5	129.3	9.4	40.2	38.4	88.0	217.3

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 15.—*Round pulpwood production in New Hampshire, by counties and species groups, 1968*

[In thousands of rough cords]

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Belknap	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Carroll	2.9	1.9	1.5	6.3	0.2	—	24.2	24.4	30.7
Cheshire	—	—	—	—	—	—	(*)	(*)	(*)
Coos	60.9	4.6	3.6	69.1	.8	—	108.5	109.3	178.4
Grafton	10.4	2.3	2.7	15.4	.1	—	12.6	12.7	28.1
Hillsboro	1.0	.2	.4	1.6	—	—	1.4	1.4	3.0
Merrimack	(*)	.1	.2	.3	(*)	—	3.8	3.8	4.1
Rockingham	—	—	—	—	—	—	.8	.8	.8
Strafford	—	(*)	.1	.1	—	—	4.7	4.7	4.8
Total	75.2	9.1	8.5	92.8	1.1	—	156.0	157.1	249.9

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 16.—*Round pulpwood production in New York, by counties and species groups, 1968*

[In thousands of rough cords]

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	—	—	—	—	—	0.1	0.7	0.8	0.8
Allegany	—	—	0.3	0.3	(*)	—	.8	.8	1.1
Broome	—	—	—	—	—	—	2.4	2.4	2.4
Cattaraugus	—	—	.5	.5	(*)	—	.9	.9	1.4
Cayuga	—	—	—	—	—	—	.8	.8	.8
Chautauqua	—	—	.3	.3	—	—	3.4	3.4	3.7
Chemung	—	—	.2	.2	—	—	—	—	.2
Chenango	0.1	—	2.3	2.4	—	—	.8	.8	3.2
Clinton	7.7	1.6	3.7	13.0	4.4	—	18.0	22.4	35.4
Columbia	—	—	—	—	.1	—	(*)	.1	.1
Cortland	—	—	.2	.2	—	—	—	—	.2
Delaware	.1	—	.2	.3	(*)	(*)	3.2	3.2	3.5
Erie	—	—	.1	.1	1.1	—	1.1	2.2	2.3
Essex	2.0	.1	—	2.1	1.5	(*)	37.2	38.7	40.8
Franklin	13.9	1.9	—	15.8	3.1	—	5.0	8.1	23.9
Fulton	.7	.1	—	.8	.1	.9	15.8	16.8	17.6
Genesee	—	—	—	—	—	—	.2	.2	.2
Greene	—	—	—	—	—	(*)	(*)	(*)	(*)
Hamilton	5.6	.5	—	6.1	.2	.4	21.3	21.9	28.0

Herkimer	6.9	.2	(*)	7.1	(*)	(*)	.9	.9	8.0
Jefferson	.1	.3	1.2	1.6	.1	—	2.2	2.3	3.9
Lewis	2.6	2.0	.3	4.9	1.1	—	14.3	15.4	20.3
Livingston	—	—	—	—	—	—	(*)	(*)	(*)
Madison	.2	—	(*)	.2	—	—	.1	.1	.3
Montgomery	(*)	.3	(*)	.3	—	.1	.8	.9	1.2
Niagara	—	—	—	—	—	—	.3	.3	.3
Onondaga	.5	.5	2.6	3.6	.2	—	1.2	1.4	5.0
Ontario	(*)	—	.1	.1	—	—	—	—	.1
Orleans	—	—	—	—	—	—	.4	.4	.4
Oswego	(*)	.2	.7	.9	(*)	—	3.5	3.5	4.4
Otsego	.4	(*)	7.3	7.7	(*)	—	.5	.5	8.2
Rensselear	—	—	—	—	(*)	.6	5.9	6.5	6.5
St. Lawrence	14.0	3.6	5.7	23.3	7.0	—	4.8	11.8	35.1
Saratoga	.2	—	1.1	1.3	.9	1.4	17.7	20.0	21.3
Schenectady	—	—	—	—	(*)	(*)	.2	.2	.2
Schoharie	—	—	—	—	—	.1	1.4	1.5	1.5
Steuban	—	—	.3	.3	(*)	—	—	(*)	.3
Sullivan	—	—	—	—	—	—	.1	.1	.1
Tioga	—	—	—	—	—	—	(*)	(*)	(*)
Tompkins	(*)	—	—	(*)	—	—	—	—	(*)
Warren	.5	—	—	.5	.6	.7	27.1	28.4	28.9
Washington	.3	—	—	.3	.6	.9	25.5	27.0	27.3
Wayne	—	—	—	—	—	—	.1	.1	.1
Wyoming	—	—	—	—	.1	—	.3	.4	.4
Yates	—	—	—	—	—	—	(*)	(*)	(*)
Total	55.8	11.3	27.1	94.2	21.1	5.2	218.9	245.2	339.4

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 17.—*Round pulpwood production in Ohio, by counties and species groups, 1968*

[In thousands of rough cords]

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	—	—	—	7.4	0.1	7.5	7.5
Ashland	—	—	0.1	0.1	—	.3	.1	.4	.5
Ashtabula	—	—	—	—	—	—	.5	.5	.5
Athens	—	—	—	—	0.8	7.1	1.6	9.5	9.5
Belmont	—	—	—	—	—	1.1	(*)	1.1	1.1
Brown	—	—	(*)	(*)	(*)	.5	.2	.7	.7
Butler	—	—	(*)	(*)	.1	.4	.4	.9	.9
Carroll	—	—	—	—	—	.1	—	.1	.1
Clermont	—	—	(*)	(*)	(*)	.2	.3	.5	.5
Clinton	—	—	.1	.1	.9	1.2	1.2	3.3	3.4
Coshocton	—	—	—	—	—	8.0	.8	8.8	8.8
Erie	—	—	—	—	.1	.4	.5	1.0	1.0
Fairfield	—	—	—	—	.1	.8	.2	1.1	1.1
Franklin	—	—	—	—	(*)	.3	.1	.4	.4
Gallis	0.2	0.1	2.3	2.6	(*)	12.8	(*)	12.8	15.4
Greene	—	—	(*)	(*)	(*)	.1	.2	.3	.3
Guernsey	—	—	—	—	—	4.0	.6	4.6	4.6
Harrison	—	—	—	—	—	—	(*)	(*)	(*)
Highland	—	—	(*)	(*)	.1	3.9	.3	4.3	4.3
Hocking	—	—	—	—	1.7	12.0	3.4	17.1	17.1
Holmes	—	—	—	—	—	1.0	.2	1.2	1.2
Huron	—	—	—	—	.1	.8	1.0	1.9	1.9
Jackson	(*)	.1	1.0	1.1	—	23.6	—	23.6	24.7

Jefferson	—	—	(*)	(*)	—	—	—	—	(*)
Knox	—	—	—	—	1.	2.5	.1	2.7	2.7
Lawrence	(*)	(*)	.6	.6	—	24.4	—	24.4	25.0
Licking	—	—	(*)	(*)	—	3.5	.2	3.7	3.7
Lorain	—	—	—	—	—	.5	.6	1.1	1.1
Meigs	(*)	(*)	.5	.5	—	.4	—	.4	.9
Monroe	(*)	(*)	.1	.1	—	(*)	—	(*)	.1
Montgomery	—	—	(*)	(*)	.2	.3	.5	1.0	1.0
Morgan	—	—	(*)	(*)	—	.7	—	.7	.7
Morrow	—	—	—	—	—	(*)	(*)	(*)	(*)
Muskingum	—	—	—	—	—	6.0	.1	6.1	6.1
Noble	—	—	(*)	(*)	.2	4.4	1.1	5.7	5.7
Perry	—	—	—	—	(*)	.5	.1	.6	.6
Pickaway	—	—	—	—	.2	1.3	.4	1.9	1.9
Pike	—	—	—	—	.1	11.0	1.0	12.1	12.1
Preble	—	—	.1	.1	(*)	.2	.2	.4	.5
Richland	—	—	—	—	—	(*)	(*)	(*)	(*)
Ross	—	—	(*)	(*)	.2	12.5	.4	13.1	13.1
Scioto	(*)	(*)	(*)	(*)	.3	25.6	.5	26.4	26.4
Seneca	—	—	—	—	.1	.4	.4	.9	.9
Stark	—	—	—	—	—	.3	.1	.4	.4
Tuscarawas	—	—	—	—	—	1.5	.3	1.8	1.8
Vinton	—	—	—	—	.3	19.6	.5	20.4	20.4
Warren	—	—	.1	.1	.2	.2	.3	.7	.8
Washington	(*)	(*)	.4	.4	—	.6	.1	.7	1.1
Wayne	—	—	—	—	—	.1	(*)	.1	.1
Wyandot	—	—	—	—	—	—	(*)	(*)	(*)
Total	0.2	0.2	5.3	5.7	5.8	202.5	18.6	226.9	232.6

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 18.—*Round pulpwood production in Pennsylvania, by counties and species groups, 1968*

[In thousands of rough cords]

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	1.1	1.1	—	5.2	2.6	7.8	8.9
Armstrong	—	—	(*)	(*)	—	—	—	—	(*)
Bedford	0.2	0.7	8.3	9.2	6.2	13.9	16.4	36.5	45.7
Berks	—	—	.1	.1	—	—	—	—	.1
Blair	—	.1	.5	.6	.1	10.8	5.2	16.1	16.7
Bradford	—	—	—	—	.9	—	4.9	5.8	5.8
Cambria	—	(*)	.7	.7	.4	2.4	2.2	5.0	5.7
Cameron	—	—	—	—	5.5	6.0	8.9	20.4	20.4
Centre	—	1.3	3.2	4.5	.6	15.6	6.6	22.8	27.3
Chester	—	—	(*)	(*)	—	—	—	—	(*)
Clarion	—	—	.1	.1	—	(*)	1.4	1.4	1.5
Clearfield	—	2.4	5.5	7.9	5.7	24.5	27.1	57.3	65.2
Clinton	—	.3	1.5	1.8	.5	5.1	1.7	7.3	9.1
Columbia	—	—	.4	.4	.1	2.8	1.6	4.5	4.9
Crawford	—	—	—	—	(*)	—	7.5	7.5	7.5
Cumberland	—	—	.6	.6	—	4.5	2.3	6.8	7.4
Dauphin	—	—	.3	.3	—	1.0	.8	1.8	2.1
Elk	—	(*)	4.0	4.0	1.4	3.3	22.6	27.3	31.3
Erie	—	—	—	—	—	—	3.8	3.8	3.8
Fayette	(*)	(*)	(*)	(*)	1.1	1.4	4.8	7.3	7.3
Forest	—	—	4.4	4.4	—	.8	6.5	7.3	11.7
Franklin	—	(*)	1.5	1.5	(*)	9.6	5.1	14.7	16.2
Fulton	—	(*)	3.1	3.1	(*)	6.0	3.1	9.1	12.2
Huntington	—	1.7	10.4	12.1	.5	20.6	13.6	34.7	46.8

Indiana	—	(*)	.4	.4	(*)	.5	.5	1.0	1.4
Jefferson	—	—	.1	.1	.3	.9	2.4	3.6	3.7
Juniata	—	.1	1.7	1.8	(*)	3.9	1.8	5.7	7.5
Lackawanna	—	—	—	—	(*)	—	(*)	(*)	(*)
Lancaster	(*)	(*)	.1	.1	—	.9	.5	1.4	1.5
Lebanon	—	—	—	—	—	.7	.7	1.4	1.4
Luzerne	—	—	.2	.2	.1	.8	2.8	3.7	3.9
Lycoming	—	.1	.2	.3	.2	.3	.3	.8	1.1
McKean	—	—	.8	.8	(*)	(*)	31.1	31.1	31.9
Mercer	—	—	—	—	—	—	.2	.2	.2
Mifflin	—	—	(*)	(*)	—	.1	(*)	.1	.1
Monroe	—	—	—	—	—	.2	.1	.3	.3
Montour	—	—	.1	.1	—	.7	.3	1.0	1.1
Northampton	—	—	(*)	(*)	—	—	—	—	(*)
Northumberland	—	—	1.2	1.2	—	2.2	1.8	4.0	5.2
Perry	—	—	1.3	1.3	—	4.2	1.5	5.7	7.0
Potter	—	—	.2	.2	2.	—	8.1	8.3	8.5
Schuylkill	—	—	.7	.7	—	3.5	1.7	5.2	5.9
Snyder	—	—	1.1	1.1	—	2.0	1.0	3.0	4.1
Somerset	(*)	.1	1.1	1.2	3.7	7.9	11.6	23.2	24.4
Sullivan	—	—	—	—	.4	—	2.6	3.0	3.0
Susquehanna	—	—	—	—	.7	—	4.6	5.3	5.3
Tioga	—	(*)	(*)	(*)	.4	—	1.6	2.0	2.0
Union	—	—	.9	.9	—	3.9	.7	4.6	5.5
Venango	—	—	.1	.1	—	7.5	7.5	15.0	15.1
Warren	—	—	.8	.8	(*)	2.4	9.7	12.1	12.9
Washington	—	—	(*)	(*)	—	.1	—	.1	.1
Wayne	—	—	—	—	.2	—	3.2	3.4	3.4
Wyoming	—	—	(*)	(*)	.7	.1	4.9	5.7	5.7
York	—	—	.6	.6	—	4.3	2.1	6.4	7.0
Total	0.2	6.8	57.3	64.3	29.9	180.6	252.0	462.5	526.8

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 19.—*Round pulpwood production in Vermont, by counties and species groups, 1968*

[In thousands of rough cords]

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Addison	0.9	—	—	0.9	0.1	—	2.3	2.4	3.3
Bennington	—	—	—	—	.1	(*)	2.7	2.8	2.8
Caledonia	9.9	0.8	0.4	11.1	(*)	—	.8	.8	11.9
Chittendon	.1	—	—	.1	.2	—	1.3	1.5	1.6
Essex	40.0	.8	.4	41.2	.2	—	21.9	22.1	63.3
Franklin	1.0	—	2.1	3.1	—	—	.4	.4	3.5
Lamoille	2.7	.1	—	2.8	—	—	.2	.2	3.0
Orange	.8	.1	.6	1.5	.1	—	.2	.3	1.8
Orleans	8.5	.4	.1	9.0	(*)	—	1.0	1.0	10.0
Rutland	3.3	—	—	3.3	.1	(*)	3.3	3.4	6.7
Washington	1.8	—	—	1.8	—	—	.2	.2	2.0
Windham	3.9	(*)	(*)	3.9	1.4	—	.1	1.5	5.4
Windsor	4.4	(*)	.1	4.5	.1	—	.9	1.0	5.5
Total	77.3	2.2	3.7	83.2	2.3	(*)	35.3	37.6	120.8

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 20.—*Round pulpwood production in West Virginia, by counties and species groups, 1968*

[In thousands of rough cords]

County[1]	Softwoods				Hardwoods				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Berkeley	(*)	(*)	6.2	6.2	(*)	2.9	1.0	3.9	10.1
Boone	—	—	(*)	(*)	—	.5	.2	.7	.7
Braxton	—	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Brooke	—	—	(*)	(*)	—	—	—	—	(*)
Cabell	0.1	(*)	.3	.4	0.2	1.5	.4	2.1	2.5
Calhoun	(*)	(*)	.2	.2	—	(*)	(*)	(*)	.2
Doddridge	.1	0.1	.3	.5	(*)	(*)	(*)	(*)	.5
Fayette	—	.1	.1	.2	—	.6	.2	.8	1.0
Gilmer	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Grant	1.1	.6	4.2	5.9	5.4	17.2	10.1	32.7	38.6
Greenbrier	—	1.0	1.5	2.5	—	27.6	8.4	36.0	38.5
Hampshire	1.9	.9	11.3	14.1	5.4	21.0	11.0	37.4	51.5
Hancock	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Hardy	1.0	.5	3.5	5.0	2.8	10.2	5.6	18.6	23.6
Harrison	—	(*)	(*)	(*)	—	—	—	—	(*)
Jackson	.4	.2	1.6	2.2	(*)	.1	(*)	.1	2.3
Jefferson	(*)	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Kanawha	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Lincoln	.1	(*)	.1	.2	(*)	(*)	(*)	(*)	.2
Marion	—	—	(*)	(*)	—	—	—	—	(*)
Marshall	—	—	—	—	—	(*)	(*)	(*)	(*)
Mason	.7	.3	2.4	3.4	(*)	.1	.1	.2	3.6
Mercer	—	—	(*)	(*)	—	—	—	—	(*)
Mineral	.6	.3	2.0	2.9	3.7	13.8	7.5	25.0	27.9

CONTINUED

Table 20.—Continued

County[1]	Softwoods				Hardwoods				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Monroe	(*)	(*)	3.0	3.0	(*)	17.7	5.4	23.1	26.1
Morgan	.2	.1	8.2	8.5	.2	5.4	2.3	7.9	16.4
Nicholas	.1	(*)	.1	.2	.2	.5	.3	1.0	1.2
Ohio	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Pendleton	.1	(*)	.7	.8	.3	1.2	.7	2.2	3.0
Pleasants	.2	.1	.8	1.1	—	.1	.1	.2	1.3
Pocahontas	.2	.1	1.6	1.9	.4	7.9	2.7	11.0	12.9
Preston	(*)	(*)	(*)	(*)	.3	3.2	.5	4.0	4.0
Putnam	.5	.3	1.9	2.7	(*)	(*)	(*)	(*)	2.7
Raleigh	—	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Randolph	.1	.1	.2	.4	.3	1.0	.5	1.8	2.2
Ritchie	.2	.1	.6	.9	—	—	(*)	(*)	.9
Roane	(*)	(*)	.2	.2	—	(*)	(*)	(*)	.2
Summers	—	—	.6	.6	—	.9	.4	1.3	1.9
Taylor	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Tucker	(*)	(*)	.3	.3	.4	2.3	.7	3.4	3.7
Tyler	(*)	(*)	.1	.1	—	—	—	—	.1
Wayne	—	—	.1	.1	.3	1.9	.5	2.7	2.8
Webster	—	—	(*)	(*)	(*)	.1	(*)	.1	.1
Wetzel	(*)	(*)	(*)	(*)	—	(*)	—	(*)	(*)
Wirt	.2	.1	7.	1.0	(*)	(*)	(*)	(*)	1.0
Wood	1.2	.6	4.1	5.9	.1	.2	.2	.5	6.4
Total	9.0	5.5	56.9	71.4	20.0	137.9	58.8	216.7	288.1

[1] Counties with no production are omitted.
* Less than 50 cords.

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BLACK WALNUT

on Nonforest Land in Kentucky

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COVER PHOTO—*Black walnut trees growing on nonforest land in Kentucky, as on this pastured woodlot, add 22 million cubic feet to the State's supply of black walnut, bringing the total in the State to 89 million cubic feet.*

BLACK WALNUT
on Nonforest Land in Kentucky

by Ronald D. Lindmark
and Paul S. DeBald

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Introduction

NOT ALL black walnut trees grow in the forest. Many are found in open places — along fence rows, in pastures, in narrow wooded strips. Trees in places like this are not counted in the forest surveys made by the U. S. Forest Service to find out how much timber we have. Yet such trees are part of our overall black walnut resource.

The U.S.D.A. Forest Service undertook a study to find out how much black walnut (*Juglans nigra* L.) timber there is in these nonforest areas. The study was made in Kentucky for two reasons. First, because Kentucky produces a lot of black walnut. Second, because a forest survey had recently been completed there.

The results of this study, supplementing the data collected in the forest survey, give us a more complete estimate of the total black walnut resource of Kentucky.

The Study

Sampling

Our statistics were obtained from a sampling survey of two sampling units — the Blue Grass and the Forested Unit (fig. 1). The Blue Grass is identical to the Blue Grass Unit of the 1963 Kentucky forest survey. The Forested Unit includes the other six forest-survey units. Although the Blue Grass is only 20 percent forested (fig. 2) and has less than one-tenth of the State's total forest area, it has more than 16 percent of the black walnut volume found on Kentucky's commercial forest land.[1]

[1] Gansner, David A. and Paul S. DeBald. KENTUCKY FORESTS — BLUE GRASS UNIT. U.S.D.A. Forest Serv. Resource Bull. CS-7, 33 pp., illus. CS. Forest Exp. Sta., Columbus, Ohio. 1966.

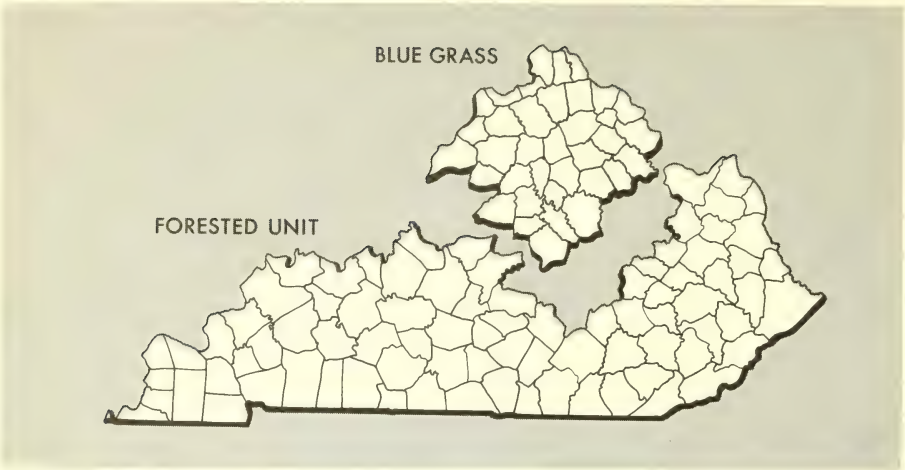

Figure 1.—Location of the sampling units.

Because we expected a high volume of black walnut in the Blue Grass, we selected study plots in every county of the Unit. In the Forested Unit, plots were taken in selected counties. We selected the counties so that our sample included the same proportion of nonforest land in each of the forest-survey units outside the Blue Grass.

Sample ground plots were drawn from records compiled during the 1963 Kentucky forest survey. In the Blue Grass one-fourth of the survey nonforest ground checks in each county were chosen at random as walnut study plots; in the Forested Unit one-half of those in the selected counties were chosen at random. Those in urban or built-up areas were discarded. We used 444 sample plots — 216 in the Blue Grass and 228 in the Forested Unit.

Using aerial photographs for reference, field crews visited each of the sample plots. A 20-acre circular area was examined at each. The forest and nonforest portions in each 20-acre sample were delineated on acetate overlays placed over the photographs. Highways and utility rights-of-way were excluded from the sample. On the nonforest portion of each sample plot, every black walnut tree was tallied. Nearly 3,000 trees were observed in the study.

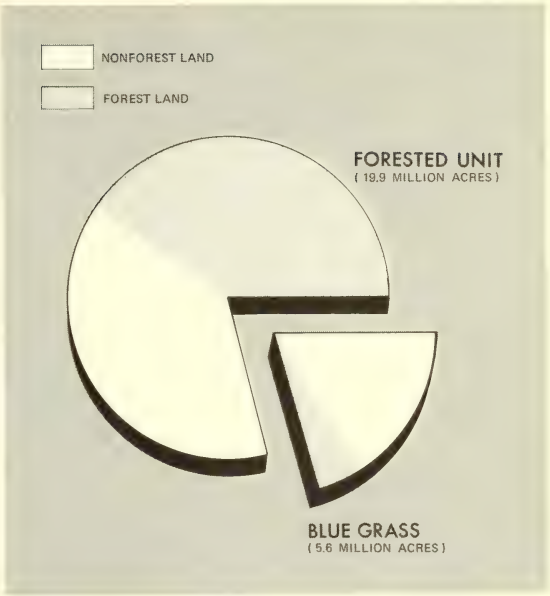

Figure 2.—Distribution of forest and nonforest land in Kentucky, by study unit, 1963.

Tree Measurements

We used forest-survey definitions and procedures as much as possible in this study. For this reason we have applied to trees on nonforest land certain terms that are usually reserved for forest-grown trees — for example, *growing stock* and *sawtimber.*

We departed most from forest-survey procedures and definitions in collecting and compiling data for short-log trees. Because open-grown black walnut trees commonly yield 6- or 7-foot bolts suitable for veneer, we determined the net volumes of short-log trees in addition to volumes of trees that met the 8-foot standard used in the forest survey. As a result, we can present two sets of volume figures for nonforest land; one set of figures is comparable to Kentucky forest-survey statistics.

We used five categories to evaluate tree quality. The first three — log grades F1, F2, and F3 — are based on the standard grade specifications for hardwood factory-lumber logs (see appendix). The fourth category — tie-and-timber — includes logs that are at least 8 feet long, but do not meet the grade specifications for

hardwood factory-lumber logs. This group, sometimes referred to as a structural log class, includes material that meets the U.S.D.A. Forest Service specifications for hardwood construction logs. The fifth category — short-logs — includes merchantable butt sections that are 6 or 7 feet long, regardless of their actual grade quality.

Because there is no uniform veneer-log grading system, we did not try to determine walnut volume by veneer quality. However, because a portion of both grade 1 and 2 logs contain veneer-quality material, we can use volume by quality classes to judge the relative amount of veneer-quality material in sawtimber trees. Also, diameter can indicate relative quality in short-log trees because the bolts from these trees are usually clear.

Computations

We found the net volume of each tallied walnut tree, using procedures consistent with those employed in the Kentucky forest survey. Then we measured the nonforest area of each sample plot from the acetate overlays that had been delineated in the field. Using this volume and area information, we determined the total net volume and volume per nonforest acre for each sample plot. In addition, we determined the average volume per nonforest acre for each of the two sampling units. Next, we arbitrarily reduced the total nonforest area in each of the two sampling units by 5 percent to adjust for nonforest land excluded from the study — urban or builtup areas, highways, and utility rights-of-way. To each unit's adjusted nonforest area we applied its average volume per nonforest acre to determine the black walnut volume on nonforest land in each unit. Finally, we estimated sampling errors for each of the two units, using the variation in per-acre volumes for the sample plots in each.

Results

Volume

Nonforest land in Kentucky contains about 22 million cubic feet of black walnut, including nearly 63 million board feet of sawtimber. More than 90 percent of this volume is in trees that meet the specifications used in the Kentucky forest survey to

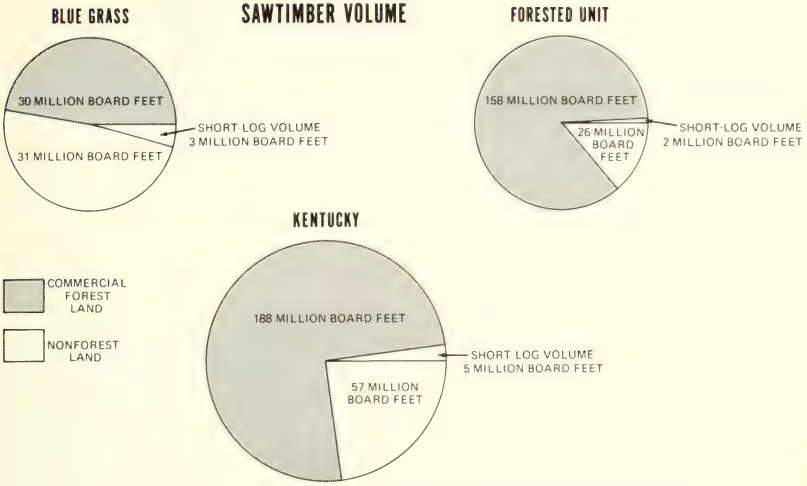

Figure 3.—Net board-foot volume of black walnut, by sampling units and for the entire state, 1965.

define growing stock and sawtimber. The rest — 2 million cubic feet or 5 million board feet — is in short-log trees.

Adding the State's nonforest walnut supply to the volume found on commercial forest land brings Kentucky's total supply of black walnut to 89 million cubic feet of timber, including 251 million board feet. The nonforest supply makes up one-fourth of this total supply.

The Blue Grass has more walnut sawtimber on nonforest land than it does on forest land. Even without the volume in short-log trees, walnut sawtimber volume on nonforest land — 31 million board feet — exceeds that found on commercial forest land in the Blue Grass. Short-log volumes add another 3 million board feet to the unit's walnut supply (fig. 3).

Nonforest land in the Forested Unit contains about 10 million cubic feet, including more than 28 million board feet, of black walnut (fig. 3). Although this volume is not as concentrated as the black walnut volume on nonforest land in the Blue Grass,

it amounts to more than 15 percent of the Forested Unit's overall supply of black walnut.

Size and Quality

Most of the black walnut trees on nonforest land in Kentucky are small in diameter. Only about one-fourth are of sawtimber size, and more than half of the sawtimber trees are smaller than 16 inches d.b.h. (fig. 4).

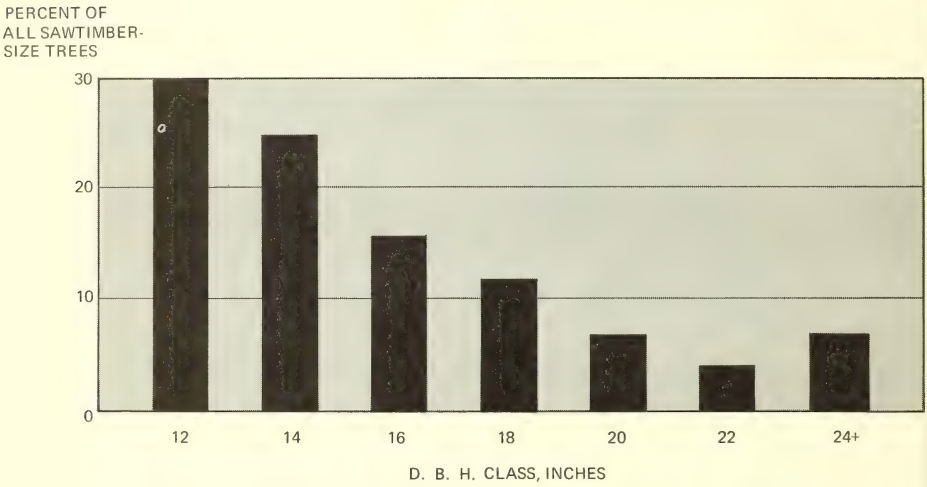

Figure 4.—Distribution of black walnut sawtimber-size trees on nonforest land, by diameter class, Kentucky, 1965.

As might be expected for open-grown trees, most of them have short boles. Fewer than one-third of the sawtimber-size trees will yield a 16-foot log. More than one-fourth have no usable bole at all. (Many grow along fence rows and actually are part of a barbed-wire fence.) Of every 100 open-grown sawtimber-size trees, 11 contain only one 6- or 7-foot bolt; and only 8 have usable lengths of 24 feet or more (fig. 5).

Even though most of the black walnut trees grown on nonforest land are short and small, many of them are large and have relatively high quality. In fact, three-fifths of the net board-

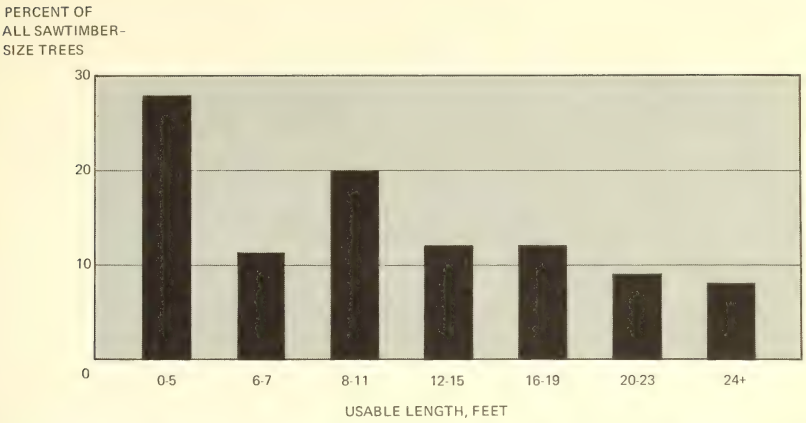

Figure 5.—Distribution of black walnut sawtimber-size trees on nonforest land, by usable length, Kentucky, 1965.

foot volume in trees with sawlog lengths of 8 feet or longer is in log grades F1 and F2 (fig. 6). Much of this material may be considered veneer quality. As for the volume in trees with bolt lengths of 6 or 7 feet, more than half is in trees 18 inches and larger. These bolts are usually clear; so much of this material may also be considered veneer quality.

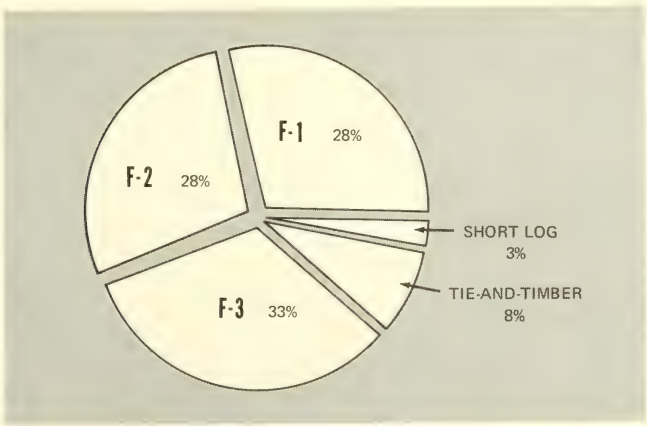

Figure 6.—Distribution of net board-foot volume of black walnut on nonforest land by quality category, Kentucky, 1965.

Conclusions

Black walnut trees growing on nonforest land in Kentucky add substantially to the State's supply of black walnut. The concentration of these trees is especially high in the Blue Grass region. Although the trees growing under nonforest conditions tend to be short-boled, many of them have large diameters and contain quality timber. Those trees that yield only one 6- or 7-foot bolt also add to the State's overall supply of black walnut.

■

Appendix

ACCURACY OF VOLUME ESTIMATES

The volume estimates in this report are subject to sampling and nonsampling errors. Sampling errors are inherent in statistical work. They can be calculated on the basis of the variation of the sample. Nonsampling errors consist of mistakes in judgment, measurement, recording, and computation. Although they cannot be measured, they can be held to a minimum by training and supervision of personnel and by checking all phases of the work.

Because the Blue Grass and the Forested Unit were sampled separately, the data for each were compiled and analyzed separately. Sampling errors were calculated for each unit, then were statistically combined to obtain a sampling error for State totals. The sampling error for the total black walnut growing-stock volume on nonforest land in the Blue Grass was ±13.3 percent. The sampling error in the Forested Unit was ±24.2 percent. The large difference in sampling errors was expected because a more intensive sample was used in the Blue Grass.

As sampling unit or state total volumes are broken down by tree size, diameter, and so forth, the sampling errors increase — the smaller the unit of volume, the larger the sampling error. The order of this increase is suggested in the following tabulation, which shows the sampling error to which the volume estimates are liable, two chances out of three.

Volume estimate	*Standard error of sampling*		
Growing stock: (thousand cubic feet)	*Blue grass (percent)*	*Forested (percent)*	*State total (percent)*
20,000	—	—	14.0
15,000	—	—	16.2
10,000	14.2	24.6	19.8
5,000	20.1	34.7	28.0
3,000	26.0	44.8	36.2
2,000	31.8	54.9	44.3
1,000	45.0	77.7	62.6
Sawtimber: (thousand board feet)			
60,000	—	—	14.6
30,000	15.7	25.5	20.7
25,000	17.2	27.9	22.7
15,000	22.3	36.1	29.2
10,000	27.3	44.2	35.8
5,000	38.6	62.5	50.7
3,000	49.8	80.6	65.4
2,000	61.0	98.8	80.1

DEFINITION OF TERMS

Land Area Classes

Total land.— The area of dry land and of land temporarily or partially covered by water such as marshes, swamps, and flood plains; streams and sloughs less than 1/8 mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

Forest land.— Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Excludes urban or thickly settled residential and resort areas, city parks, orchards, farmsteads, improved roads, or lands developed and maintained for nonforest use. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must be at least 120 feet wide to qualify as forest land. Unimproved roads, trails, and streams less than 120 feet wide and clearings less than 1 acre in size within forest land are also included as forest.

Commercial forest land.— Forest land that is producing or is capable of producing crops of industrial wood and that is not withdrawn from timber utilization by statute or administrative regulation. Industrial wood includes commercial products such as sawlogs and pulpwood but excludes fuelwood and fence posts.

Nonforest land.—Land that has never supported forests and lands formerly forested that are now developed for other uses. Includes areas used for crops, improved pasture, residential areas, city parks, and improved roads or power-line clearings of any width. If intermingled in forest areas, unimproved roads, trails, and nonforest strips must be more than 120 feet wide and clearings more than 1 acre in size to qualify as nonforest.

Adjusted nonforest area.— Nonforest land area reduced by 5 percent to make allowances for nonforest areas excluded from this study — urban and builtup areas, highways, and utility rights-of-way.

Volume Classes

Growing-stock volume.— Net volume in cubic feet of sound wood in the boles of live sawtimber and poletimber trees from stump to a minimum 4.0-inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Does not include short-log trees.

Net cubic-foot volume.— Growing-stock volume as defined above plus the net volume in cubic feet of short-log trees.

Sawtimber volume.— Net volume in board feet (International 1/4-inch rule) in the sawlog portions of live sawtimber trees from a 1-foot stump to a minimum 8.0-inch top diameter inside bark or to the point on the bole of sawtimber trees above which a sawlog cannot be produced. A sawlog is a log that is at least 8 feet long and meets the other standards of diameter and defect as specified for grade F1, F2, or F3 logs or for tie-and-timber class logs.

Net board-foot volume.—Sawtimber volume as defined above plus the net volume in board feet (International 1/4-inch rule) of short-log trees.

Short-log volume.— Net volume in short-log trees — those containing 6- or 7-foot usable saw lengths, now or prospectively — expressed in either net cubic feet or net board feet (International 1/4-inch rule).

Tree Size Classes

Sawtimber trees.— Live trees 11.0 inches d.b.h. and larger, containing at least an 8-foot sawlog.

Poletimber trees.— Live trees 5.0 to 10.9 inches d.b.h. that are of good form and vigor (i.e., are expected to produce at least an 8-foot sawlog).

Short-log trees.— Live trees 5.0 inches d.b.h. and larger that contain, now or prospectively, a usable 6- or 7-foot bolt.

Diameter Measurements

Diameter at breast height (d.b.h.).— The diameter of a tree at 4.5 feet above ground level.

Diameter class.— Trees in a 2-inch diameter range, ranging from 1.0 inch below the midpoint of the class to 0.9 inch above the midpoint. For example, the 12-inch class would include trees from 11.0 to 12.9 inches d.b.h.

QUALITY CATEGORIES

Log quality is based on surface characteristics. Sawtimber trees were classified according to the U.S.D.A. Forest Service HARDWOOD LOG GRADES FOR STANDARD LUMBER and Forest Service standard specifications for hardwood tie-and-timber class logs. Sawtimber-size short-log trees were classified primarily on the basis of having a 6- or 7-foot usable length. The following standards were used for assigning quality categories:

HARDWOOD LOG GRADES FOR STANDARD LUMBER

Grade factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Minimum scaling diameter (inches)		13-15	16-19	20+	11[1]	12+			8+
Minimum length (feet)		10+	10+	10+	10+	8-9	10-11	12+	8+
Clear cuttings[2] on each of the 3 best faces	Minimum length (feet)	7	5	3	3	3	3	3	2
	Maximum number	2	2	2	2	2	2	3	No limit
	Minimum yield in face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook deduction (percent of gross volume)		15			30				50
Maximum cull deduction including sweep and crook (percent of gross volume)		40[3]			50[4]				50

[1] 10-inch logs can be No. 2 if otherwise meeting requirements for small No. 1's.
[2] A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.
[3] Otherwise No. 1 logs with 41-50 percent cull can be No. 2.
[4] Otherwise No. 2 logs with 51-60 percent cull can be No. 3.

SPECIFICATIONS FOR TIE-AND-TIMBER LOGS

Grade factors		Specifications
Position in tree		Butts and uppers
Scaling diameter		8 inches and larger
Length, without trim		8 feet and longer
Clear cuttings		No requirements: Not graded on cutting basis.
Maximum sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar[1] diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound defects permitted	Surface	Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.
	Interior	None permitted except one shake not more than one-third the width of contained tie or timber and one split not over 5 inches long.

[1] Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

SPECIFICATIONS FOR SHORT-LOG TREES

Grade factors	Specifications
Position in tree	Butts
Scaling diameter	8 inches and larger
Length, without trim	6 foot and 7 foot

STATISTICAL TABLES

Table 1.—Area by land class and study unit, Kentucky, 1965

[In acres]

Land class	State total	Blue Grass	Forested Unit
Total land[1]	25,512,300	5,648,600	19,863,700
Forest land[2]	11,855,200	1,135,500	10,719,700
Nonforest land[2]	13,657,100	4,513,100	9,144,000
Adjusted nonforest[3]	12,974,200	4,287,400	8,686,800

[1] From U.S. Bureau of Census, LAND AND WATER AREA OF THE UNITED STATES, 1960.

[2] From Gansner, David A. TIMBER RESOURCES OF KENTUCKY, U.S.D.A. Forest Serv. Resource Bull. NE-9. 97 pp., illus. NE. Forest Exp. Sta., Upper Darby, Pa. 1968.

[3] Total nonforest area was reduced by 5 percent to account for urban developments, highways, and so forth.

Table 2.—Net cubic foot volume of black walnut by land class, volume class, and study unit, Kentucky, 1965

[In thousands of cubic feet]

Land class	State total	Blue Grass	Forested Unit
Commercial forest land[1]	66,750	10,990	55,760
Nonforest land:			
Growing-stock volume[2]	20,200	10,440	9,760
Short-log volume[3]	1,560	1,010	550
Total nonforest land	21,760	11,450	10,310
All land	88,510	22,440	66,070

[1] From Gansner, David A. TIMBER RESOURCES OF KENTUCKY, U.S.D.A. Forest Serv. Resource Bull. NE-9. 97 pp., illus. NE. Forest Exp. Sta., Upper Darby, Pa. 1968.

[2] Volume estimates in this class meet the specifications for growing stock used in the Kentucky forest survey and are directly comparable to data shown for the commercial forest land class.

[3] Volume in 6- or 7-foot bolts.

Table 3.—Net board-foot volume of black walnut by land class, volume class, and study unit, Kentucky, 1965

[In thousands of board feet][1]

Land class	State total	Blue Grass	Forested Unit
Commercial forest land[2]	188,160	30,100	158,060
Nonforest land			
Sawtimber volume[3]	57,410	31,170	26,240
Short-log volume[4]	5,210	3,380	1,830
Total nonforest land	62,620	34,550	28,070
All land	250,780	64,650	186,130

[1] International ¼-inch rule.

[2] From Gansner, David A. TIMBER RESOURCES OF KENTUCKY. U.S.D.A. Forest Serv. Resource Bull. NE-9. 97 pp., illus. NE. Forest Exp. Sta., Upper Darby, Pa. 1968.

[3] Volume estimates in this class meet the specifications for sawtimber used in the Kentucky Forest Survey and are directly comparable to data shown for the commercial forest land class.

[4] Volume in 6- or 7-foot bolts.

Table 4.—Number of live black walnut trees on nonforest land, by d.b.h. class and study unit, Kentucky, 1965

[In thousands of trees]

D.b.h. class (*inches*)	State total	Blue Grass	Forested Unit
2	633	399	234
4	997	597	400
6	887	475	412
8	679	314	365
10	568	266	302
12	370	192	178
14	314	198	116
16	204	124	80
18	154	68	86
20	87	48	39
22	47	32	15
24+	77	41	36
Total	5,017	2,754	2,263

Table 5.—Net cubic-foot volume of black walnut on nonforest land, by d.b.h. class and study unit, Kentucky, 1965

[In thousands of cubic feet]

D.b.h. class (*inches*)	State total	Blue Grass	Forested Unit
6	780	410	370
8	1,930	890	1,040
10	2,520	1,140	1,380
12	3,250	1,560	1,690
14	2,860	1,920	940
16	2,850	1,500	1,350
18	2,490	1,270	1,220
20	1,410	730	680
22	1,040	780	260
24+	2,630	1,250	1,380
Total	21,760	11,450	10,310

Table 6.—Net board-foot volume of black walnut on nonforest land, by d.b.h. class and study unit, Kentucky, 1965

[In thousands of board feet][1]

D.b.h. class (*inches*)	State total	Blue Grass	Forested Unit
12	11,640	5,710	5,930
14	12,650	8,250	4,400
16	10,880	6,110	4,770
18	7,630	3,560	4,070
20	5,340	2,730	2,610
22	5,350	2,640	2,710
24+	9,130	5,550	3,580
Total	62,620	34,550	28,070

[1] International ¼-inch rule.

Table 7.—Number of black walnut sawtimber-size trees on nonforest land, by d.b.h. class and usable length, Kentucky, 1965

[In thousands of trees]

D.b.h. class (*inches*)	Usable length (feet)							
	0-5	6-7	8-11	12-15	16-19	20-23	24+	Total
12	81	25	84	60	40	44	36	370
14	82	40	66	30	49	26	21	314
16	55	22	33	32	26	20	16	204
18	55	22	34	10	20	10	3	154
20	32	15	15	8	8	4	5	87
22	13	5	6	5	6	6	6	47
24+	33	5	14	4	3	8	10	77
Total	351	134	252	149	152	118	97	1,253

Table 8.—Net board-foot volume of black walnut on nonforest land, by usable length and study unit, Kentucky, 1965

[In thousands of board feet][1]

Usable length (*feet*)	State total	Blue Grass	Forested Unit
6- 7	5,210	3,380	1,830
8-11	13,070	6,490	6,580
12-15	9,290	4,860	4,430
16-19	12,040	7,800	4,240
20-23	10,580	5,040	5,540
24+	12,430	6,980	5,450
Total	62,620	34,550	28,070

[1] International ¼-inch rule.

Table 9.—Net board-foot volume of black walnut on nonforest land, by quality category and study unit, Kentucky, 1965

[In thousands of board feet][1]

Quality category	State total	Blue Grass	Forested Unit
Log grade F-1	17,490	5,840	11,650
Log grade F-2	17,090	9,660	7,430
Log grade F-3	20,850	13,790	7,060
Tie-and-timber	1,980	1,880	100
Short-log trees	5,210	3,380	1,830
Total	62,620	34,550	28,070

[1] International ¼-inch rule.

THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

Primary Wood Products Output in NEW YORK - 1967

by James T. Bones
and Carl E. Mayer

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FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

COVER PHOTO: *These hardwood sawlogs are awaiting manufacture at one of the larger sawmills in Herkimer County.* **Photo credit:** *New York State Conservation Department.*

FOREWORD

THE FOREST SERVICE of the U. S. Department of Agriculture conducts continuing forest surveys of all states to provide up-to-date information about the timber resources of the Nation. In the Northeastern Forest Experimentation Station's territory, all states have been surveyed at least once, and several have been resurveyed.

In the recently completed resurvey of New York, statistics about timber removals were gathered. This report is the result of a 100-percent canvass of New York primary wood processors by the Station's Forest Survey project and the New York State Conservation Department. Pulpwood production data were gathered as part of the Experiment Station's annual survey of the woodpulp producers of the Northeast.

During the canvass the Conservation Department assembled a list of all known firms and later contacted in person all in-state nonrespondents. The Experiment Station mailed questionnaires to each firm, including possible out-of-state consumers of New York wood, and later contacted all out-of-state nonrespondents by phone.

THE AUTHORS

JAMES T. BONES, research forester, received his bachelor's degree in soil conservation from Utah State University in 1952 and his master's degree in forest management from the same university in 1956. He worked in Forest Survey at the Pacific Northwest Station and the Institute of Northern Forestry before transferring to the Northeastern Forest Experiment Station in March 1968. He is now stationed in Upper Darby, Pa., where he is working in the timber-removals phase of Forest Survey.

CARL E. MAYER is the Forest Survey project leader at the Northeastern Forest Experiment Station. He received his bachelor's degree in forestry from Iowa State University in 1943. After military service as an officer in the U. S. Marine Corps, he spent 12 years in Forest Survey at the Pacific Northwest Station in Portland, Oregon. He transferred to the Northeastern Station in 1958. Since that time he has directed the Forest Survey of the Northeastern area.

Primary Wood Products Output in NEW YORK - 1967

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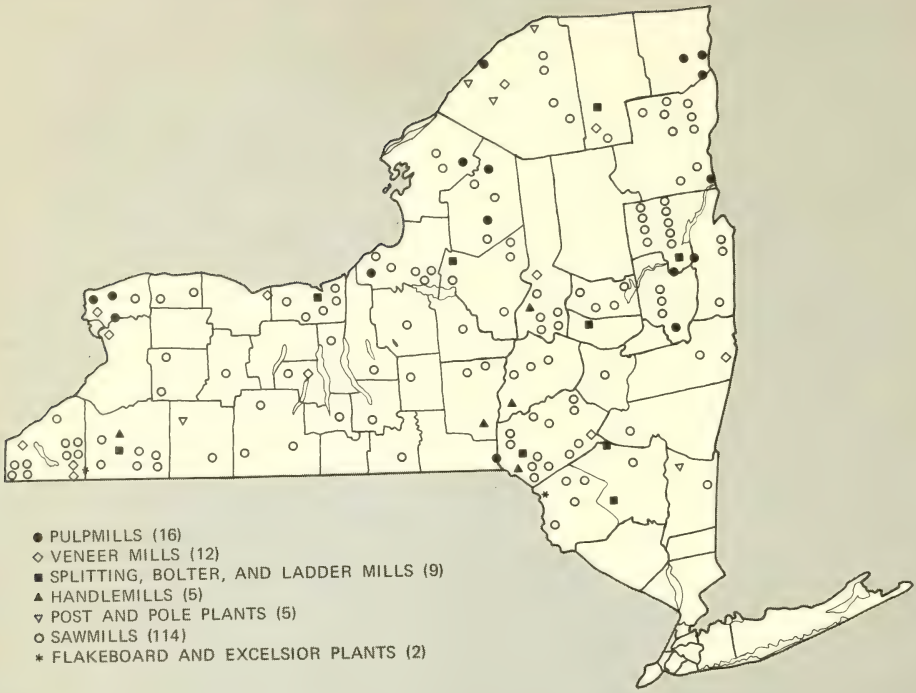

● PULPMILLS (16)
◇ VENEER MILLS (12)
■ SPLITTING, BOLTER, AND LADDER MILLS (9)
▲ HANDLEMILLS (5)
▽ POST AND POLE PLANTS (5)
○ SAWMILLS (114)
* FLAKEBOARD AND EXCELSIOR PLANTS (2)

Figure 1.—The location of primary wood-using plants in New York. The numbers in parentheses indicate the number operating in 1967. Sawmills shown are those producing more than 1 million board feet.

Highlights

Nearly 100 million cubic feet of industrial roundwood were harvested in 1967 from New York forests — up 7 percent from 1950.

New York pulpwood suppliers continued to provide a high percentage of domestic mill receipts.

The veneer industry shifted production emphasis from basket veneer to face veneer.

Use of plant residues increased — to 76 percent of the total available.

Warren County was a major wood processor, receiving nearly 34 million board feet of sawlogs and producing over 36 thousand cords of pulpwood.

Trends in Total Output

Nearly 100 million cubic feet of industrial roundwood were harvested from New York forests in 1967 (table 1). Although output in the early 1950's was greater, it was inflated because of timber-salvage operations. Today there are indications that a healthier, more stable industry is developing and that New York forests are furnishing a greater proportion of industry's wood requirements.

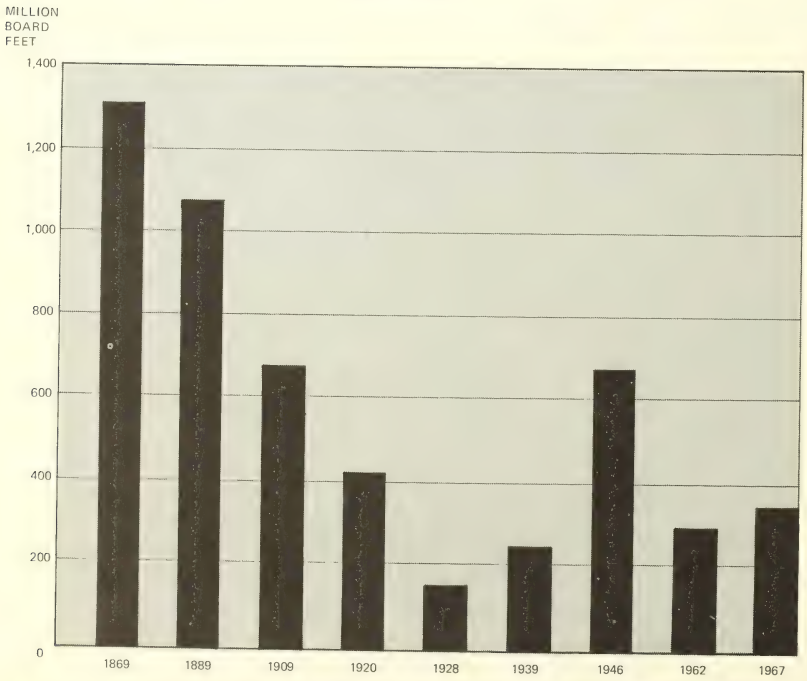
Sawlog and pulpwood production, which accounted for 89 percent of the total 1967 output, were up 4 and 46 percent respectively from 1950 levels (table 2). Output of veneer logs, poles and posts, and miscellaneous products was down.

A major shift occurred in the species harvested for roundwood products between 1950 and 1967. The volume of softwood removals dropped 48 percent, while the volume of hardwood removals rose 56 percent.

Lumber Production— The Past 100 Years

In 1869, when New York lumber production was 1.3 billion board feet, the sawmilling zenith had already been reached; and production was diminishing rapidly (fig. 2). By the turn of the century, 1,042 sawmills produced 878 million board feet. An historic low was recorded during the predepression year of 1928

Figure 2.—Lumber production in New York for selected years, 1870-1967.



when 364 sawmills produced 157 million board feet. Since then the industry has been recovering slowly. The heavy demands for wood during World War II and the hurricane blowdown timber salvage program of the early 1950's contributed greatly to the upturn. Our canvass showed that in 1967 the 302 operating sawmills in New York produced 353 million board feet of lumber.

Number of Sawmills Decreasing

From 364 operating sawmills in 1928, the number rose to 1,557 mills in 1952 as many small seasonal and marginal producers entered the industry in response to the high wartime lumber requirements. Between 1952 and 1967, while stumpage and operating costs were increasing, the diameter and quality of the average sawlog available to the mill operator was decreasing. These negative factors, coupled with a slackened lumber demand, drove

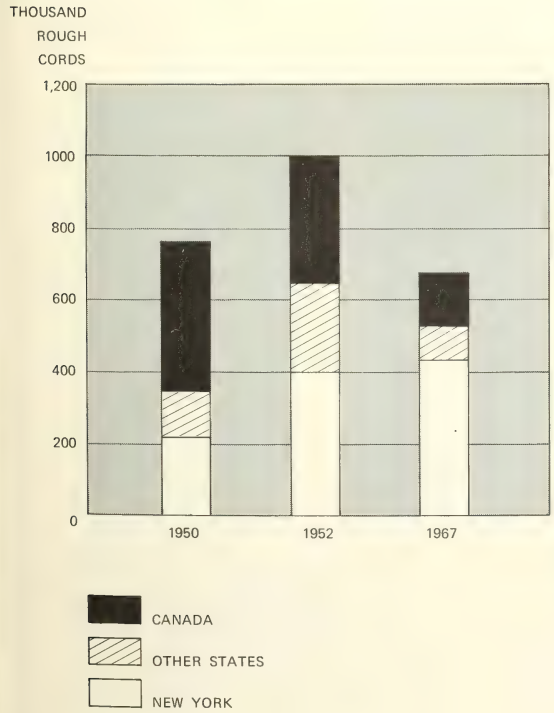


Figure 3.—Total pulpwood receipts in New York, by source, for selected years.

many mills out of business and reduced the number of operating sawmills to 302 (table 3). Note the high mortality of small producers — 780 in the 0-to-49-thousand board-foot class — as compared to four in the 1,000+ class.

More Pulpmill Wood from New York Forests

Historically the New York woodpulp industry has been sustained by coniferous roundwood purchased mainly from other states and Canada (fig. 3). The industry grew rapidly after the first mill was established in 1866, and by 1910 it had 98 pulpmills and led the Nation in pulp production. Production generally has mirrored the national economy but as late as 1950, New York

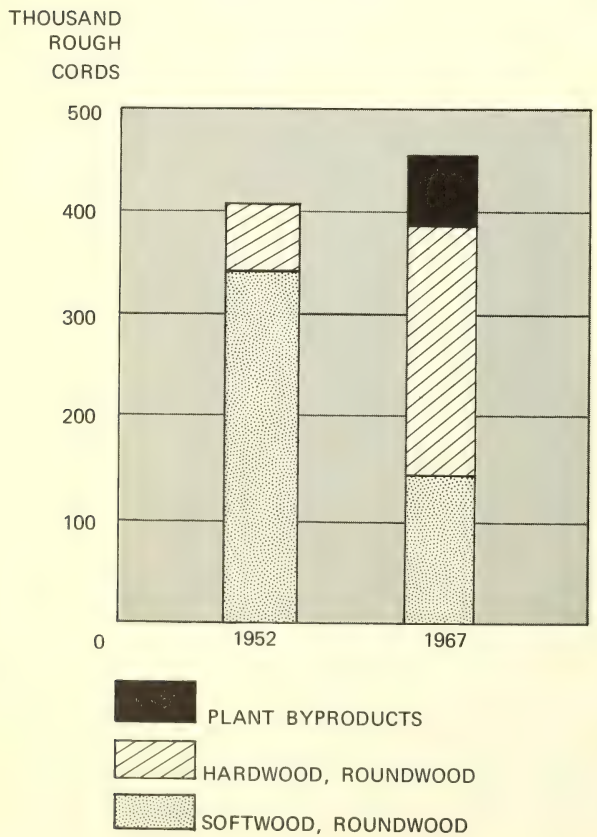


Figure 4.—Total pulpwood production in New York, 1952 and 1967.

forests were accounting for only 27 percent of the industry's total wood receipts in New York State.

In the past 15 years advances in pulping technology have caused radical changes in the industry. Today's mills produce pulp from hardwoods as well as softwoods, and are equipped for receiving and processing large quantities of both roundwood and chips (fig. 4).

In 1952, 85 percent of New York's pulpwood came from softwood trees, but by 1967 only 29 percent came from this species group. Also in 1952, less than 3 thousand cord-equivalents of New York pulpwood production came from chips generated as a byproduct of other primary wood manufacturing plants, but by 1967 nearly 69 thousand cords came from this source. Because New York has ample quantities of the kind of raw material that local woodpulp mills now require, it furnished 449 thousand cords in 1967; this represented two-thirds of the industry's total receipts.

Veneer Industry Rebounding

Recent developments in the veneer industry could be setting the stage for a rebound of this segment of New York's primary wood processors.

Twenty-nine firms consumed 23 million board feet of wood in 1952. Fourteen of these firms were producing basket veneer for western New York fruit and vegetable growers.

In 1967, a dozen firms consumed an equal quantity of wood (23.7 million board feet) but only three of these firms were producing basket veneer. The expansion of existing face-veneer plants and the establishing of new ones caused wood consumption to rebound from a low of 13 million board feet in fiscal-year 1963-64 to present levels.

The State consumed more veneer logs than it produced. Veneer-log production was 22.1 million board feet in 1967. Approximately 1.5 million board feet of New York logs were shipped to five neighboring states, while 3.2 million board feet were purchased from seven states by New York processors (tables 4 and 5). Red oak and hard maple were the most important species exported; white birch and yellow-poplar were important imports.

Plant Residues Find Ready Markets

Nearly 33 million cubic feet of wood residues were generated by New York primary wood manufacturers in 1967. Seventy-six percent, or 25 million cubic feet, of these residues were used (see tables 8 and 9).

Traditionally most of the fine material (sawdust and shavings) is used by the dairy industry as livestock bedding. In 1967 over 8 million cubic feet, representing 59 percent of the total available, went to this use.

During the past decade, debarkers and chippers were installed in many of the large sawmills, and the slabs and edgings were converted into pulp chips. Nearly 8 million cubic feet of chips were produced in 1967, representing 41 percent of the coarse residues available. Fuel — both industrial and domestic — also represents a major use of coarse residues.

■

Table 1.—Volume of industrial roundwood production in New York, 1967

Product	Volume in standard units				Roundwood volume		
	Standard units	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
					Thousand cubic feet		
Sawlogs	M board feet[1]	353,376	63,526	289,850	56,025	10,988	45,037
Pulpwood	Standard cords	394,300	132,600	261,700	31,544	10,608	20,936
Veneer logs	M board feet[1]	22,053	—	22,053	3,426	—	3,426
Poles	M pieces	5	5	—	31	31	—
Posts	M pieces	4,800	700	4,100	2, 976	434	2,542
Miscellaneous products[2]	M cubic feet	3,882	97	3,785	3,882	97	3,785
Total	—	—	—	—	97,884	22,158	75,726

[1] International ¼-inch rule.
[2] Includes handle stock, excelsior, bobbin and shuttle blocks, and miscellaneous dimension stock.

Table 2.—Timber products output from roundwood for New York, 1950 and 1967

Product	All species			Softwoods			Hardwoods		
	1950	1967	Change	1950	1967	Change	1950	1967	Change
	Million cubic feet		*Percent*	*Million cubic feet*		*Percent*	*Million cubic feet*		*Percent*
Sawlogs	53.7	56.0	+ 4	26.0	11.0	−58	27.7	45.0	+ 63
Pulpwood	21.6	31.5	+46	16.2	10.6	−35	5.4	20.9	+287
Veneer logs	4.4	3.4	−23	—	—	—	4.4	3.4	− 23
Poles and posts	3.6	3.0	−17	.6	.4	−33	3.0	2.6	− 13
Miscellaneous products[2]	8.0	3.9	−51	(1)	.1	+96	8.0	3.8	− 53
Total	91.3	97.8	+ 7	42.8	22.1	−48	48.5	75.7	+ 56

[1] Less than 50,000 cubic feet.
[2] Includes cooperage bolts, piling, chemical wood, handle stock, and excelsior. Does not include fuelwood.

Table 3.—Number of sawmills in New York, by annual production class, 1952 and 1967

Production class (thousands of board feet)	Sawmills	
	1952	1967
	Number	*Number*
Idle	200	137
0-49	817	37
50-199	334	59
200-499	189	50
500-999	99	42
1000+	118	114
Total number operating	1,557	302

Table 4.—Production of veneer logs and bolts in New York, and state where used, by species 1967

(In thousands of board feet, International ¼-inch rule)

Species	Indiana	Kentucky	New Hampshire	New York	Penn-sylvania	West Virginia	All states
Ash	1	—	—	—	—	—	1
Basswood	—	—	—	1,105	—	—	1,105
Beech	—	—	—	1,753	—	—	1,753
Yellow birch	—	—	38	4,729	—	—	4,767
White birch	—	—	—	667	—	—	667
Butternut	1	—	—	—	—	12	13
Cherry	82	—	—	658	—	—	740
Elm	—	—	—	3,396	—	—	3,396
Hickory	—	—	—	31	—	110	141
Hard maple	204	—	—	2,947	—	—	3,151
Soft maple	—	—	—	584	—	—	584
White oak	2	—	—	35	—	120	157
Red oak	—	81	171	2,385	552	172	3,361
Black oak	—	—	—	2,106	—	—	2,106
Yellow-poplar	—	—	—	66	—	—	66
Other	—	—	—	45	—	—	45
All species	290	81	209	20,507	552	414	22,053

Table 5.—Consumption of veneer logs and bolts in New York, and state of origin, by species 1967

(In thousands of board feet, International ¼-inch rule)

Species	Connecticut	Massachusetts	New Jersey	New York	Ohio	Pennsylvania	Vermont	West Virginia	All states
Basswood	—	—	—	1,105	10	10	—	19	1,144
Beech	—	—	—	1,753	—	2	—	—	1,755
Yellow birch	—	86	—	4,729	—	—	86	—	4,901
White birch	—	739	—	667	—	—	738	—	2,144
Cherry	—	29	—	658	—	—	29	—	716
Elm	—	—	—	3,396	—	1	—	—	3,397
Hickory	—	—	—	31	—	—	—	—	31
Hard maple	29	—	29	2,947	5	62	—	8	3,080
Soft maple	—	—	—	584	—	—	—	2	586
White oak	—	—	—	35	14	14	—	—	63
Red oak	59	—	59	2,385	15	133	—	—	2,651
Black oak	59	—	59	2,106	—	118	—	—	2,342
Yellow-poplar	—	—	—	66	122	444	—	262	894
Other	—	—	—	45	—	—	—	—	45
All species	147	854	147	20,507	166	784	853	291	23,749

Table 6.—Sawlog production by species groups and county where used, New York, 1967

[In thousands of board feet][1]

County	All species	Softwoods	Hardwoods
Albany	1,098	623	475
Allegany	3,608	217	3,391
Broome	1,367	194	1,173
Cattaraugus	15,047	516	14,531
Cayuga	1,993	96	1,897
Chautauqua	24,915	615	24,300
Chemung	1,550	118	1,432
Chenango	8,767	1,964	6,803
Clinton	1,851	1,130	721
Columbia	1,426	500	926
Cortland	8,485	296	8,189
Delaware	23,281	1,664	21,617
Dutchess	3,731	143	3,588
Essex	23,950	17,864	6,086
Erie	749	274	475
Franklin	651	105	546
Fulton	14,946	4,486	10,460
Genesee	1,031	—	1,031
Greene	2,829	635	2,194
Hamilton	1,072	428	644
Herkimer	23,745	1,313	22,432
Jefferson	4,149	662	3,487
Lewis	12,041	904	11,137
Livingston	5,609	292	5,317
Madison	2,498	392	2,106
Monroe	173	—	173
Montgomery	874	30	844
Nassau	—	—	—
Niagara	1,297	—	1,297
Oneida	8,993	346	8,647
Onondaga	1,231	30	1,201
Ontario	1,136	28	1,108
Orange	1,932	232	1,700
Orleans	3,889	14	3,875
Oswego	16,366	1,703	14,663
Otsego	6,169	2,847	3,322
Putnam	500	—	500
Rensselaer	3,778	2,132	1,646
Rockland	—	—	—
St. Lawrence	14,206	2,428	11,778
Saratoga	10,016	4,779	5,237
Schenectady	—	—	—
Schoharie	2,913	1,216	1,697
Schuyler	4,941	480	4,461
Seneca	2,896	135	2,761

CONTINUED

Table 6 — Continued

County	All species	Softwoods	Hardwoods
Steuben	7,144	1,756	5,388
Suffolk	202	75	127
Sullivan	7,622	864	6,758
Tioga	4,471	491	3,980
Tompkins	1,204	19	1,185
Ulster	4,314	474	3,840
Warren	33,930	7,391	26,539
Washington	7,173	264	6,909
Wayne	8,863	39	8,824
Westchester	—	—	—
Wyoming	4,945	174	4,771
Yates	1,809	148	1,661
Total	353,376	63,526	289,850

[1] International ¼-inch rule.

Figure 5.—Sawlog production in New York in 1967, by county where used.

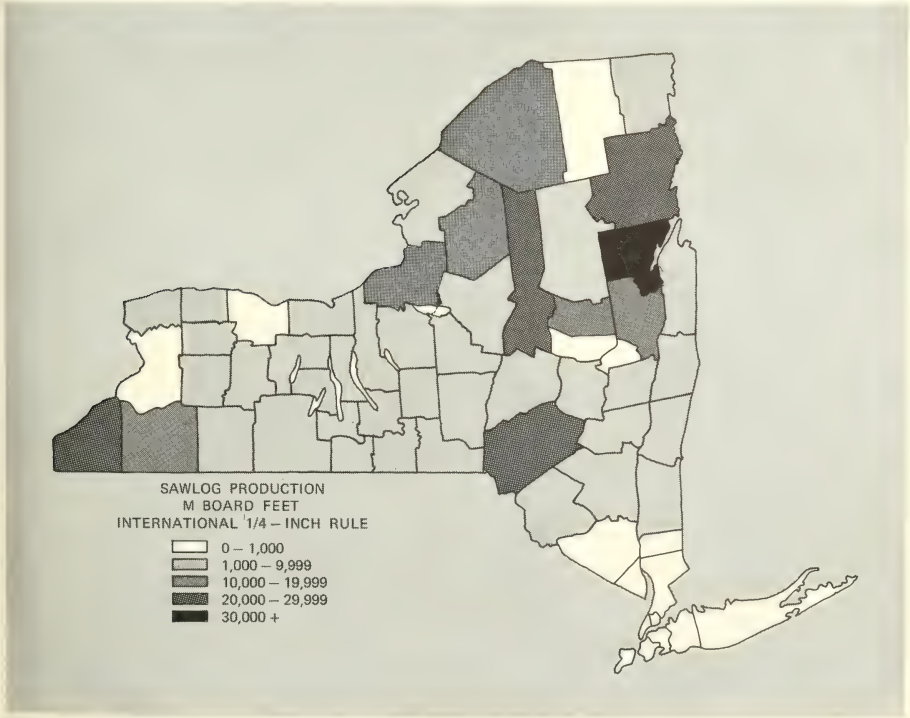


Table 7.—Pulpwood production from roundwood by species groups and counties, New York, 1967

(In thousands of standard cords)[1]

County	All species	Softwoods	Hardwoods
Albany	1.2	—	1.2
Allegany	1.1	0.5	.6
Broome	1.6	.1	1.5
Cattaraugus	1.2	(2)	1.2
Cayuga	.3	.3	—
Chautauqua	1.8	.7	1.1
Chemung	(2)	(2)	—
Chenango	4.6	3.4	1.2
Clinton	29.0	11.5	17.5
Columbia	.7	—	.7
Cortland	.7	.7	—
Delaware	4.5	1.9	2.6
Erie	3.1	.2	2.9
Essex	51.8	5.8	46.0
Franklin	25.3	20.0	5.3
Fulton	15.8	1.9	13.9
Genesee	1.2	—	1.2
Greene	.5	—	.5
Hamilton	29.7	10.1	19.6
Herkimer	11.4	5.5	5.9
Jefferson	3.1	1.9	1.2
Lewis	34.2	15.4	18.8
Livingston	(2)	(2)	—
Madison	(2)	(2)	(2)
Montgomery	2.8	.6	2.2
Niagara	1.4	—	1.4
Onondaga	10.1	4.8	5.3
Ontario	.5	.5	—
Orleans	.4	—	.4
Oswego	13.1	3.1	10.0
Otsego	10.7	9.1	1.6
Rensselaer	7.2	—	7.2
St. Lawrence	38.3	27.6	10.7
Saratoga	27.8	5.6	22.2
Schenectady	.8	—	.8
Schoharie	2.4	—	2.4
Schuyler	.1	.1	—
Steuben	.4	.4	—
Sullivan	(2)	—	(2)
Tioga	.1	—	.1
Tompkins	.1	.1	—
Warren	36.2	.4	35.8
Washington	17.4	.3	17.1
Wayne	.2	.1	.1
Wyoming	1.5	—	1.5
Total	394.3	132.6	261.7

[1] Rough wood basis.
[2] Less than 50 cords.

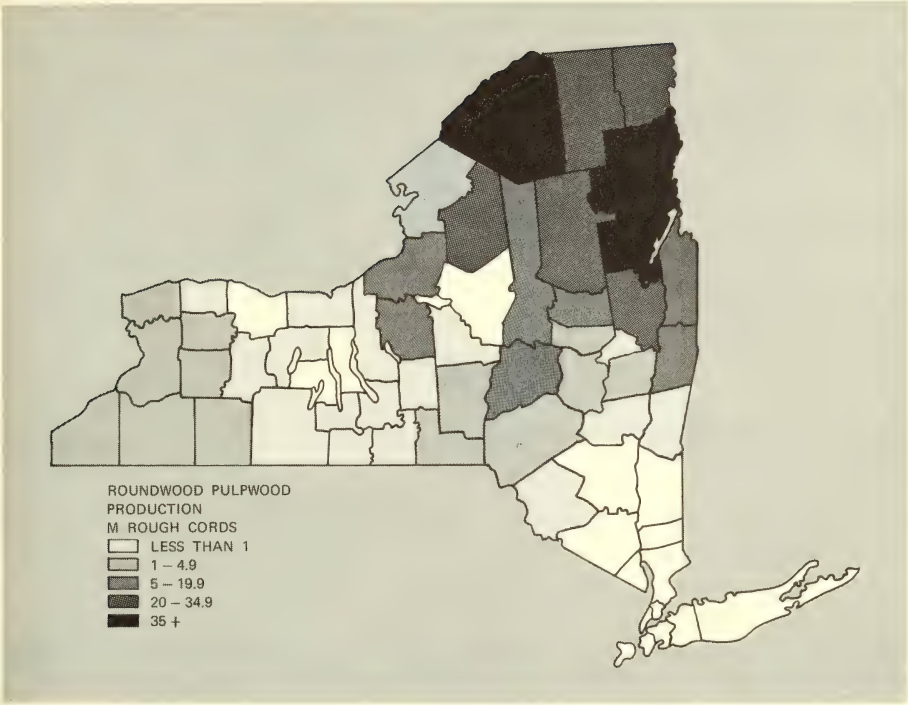


Figure 6.—Round pulpwood production in New York in 1967, by counties.

Table 8.—Total residues from primary wood-processing plants by industrial source, type of residue, and by species groups, New York, 1967

(In thousands of cubic feet)

Industrial source[1] and type of residue	All species	Softwoods	Hardwoods
Lumber industry:			
Coarse[2]	16,862	3,225	13,637
Fine[3]	11,668	2,033	9,635
Total	28,530	5,258	23,272
Veneer industry:			
Coarse	827	—	827
Fine	1,234	—	1,234
Total	2,061	—	2,061
Other primary industries:			
Coarse	1,347	41	1,306
Fine	732	23	709
Total	2,079	64	2,015
All industries:			
Coarse	19,036	3,266	15,770
Fine	13,634	2,056	11,578
Total	32,670	5,322	27,348

[1] Excludes woodpulp industry.

[2] Coarse residues include slabs, edgings, trimmings, and other material considered suitable for chipping.

[3] Fine residues include sawdust, shavings, and other material considered unsuitable for chipping.

Table 9.—Volume of byproducts from primary wood processing plants, by source, type of use, and species groups, New York, 1967

(In thousands of cubic feet)

Source industry[1]	Type of use	All species	Softwoods	Hardwoods
Lumber	Fiber[2]	7,640	995	6,645
	Fuel[3]	4,329	468	3,861
	Agricultural bedding	7,750	1,460	6,290
	Other[4]	1,119	96	1,023
	All uses	20,838	3,019	17,819
Veneer	Fiber	119	—	119
	Fuel	1,737	—	1,737
	Agricultural bedding	72	—	72
	Other	121	—	121
	All uses	2,049	—	2,049
Other industries	Fuel	1,049	29	1,020
	Agricultural bedding	256	1	255
	Other	567	31	536
	All uses	1,872	61	1,811
All industries	Fiber	7.759	995	6.764
	Fuel	7,115	497	6,618
	Agricultural bedding	8,078	1,461	6,617
	Other	1,807	127	1,680
	Total	24,759	3,080	21,679

[1] Excludes woodpulp industry.

[2] Includes 5,504 M cubic feet of residues for pulp along with residues for hardboard and particle board.

[3] Includes all residues used as domestic or industrial fuel whether sold or given away.

[4] Includes residues used for charcoal, small dimension stock, specialty items, and wood flour.

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THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

Primary Wood Products Output in OHIO—1966

by James T. Bones
and David R. Dickson

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RICHARD D. LANE, DIRECTOR

COVER PHOTO: *Mountains of wood are required to supply Ohio's expanding wood-using industries.* **Photo credit**: *Ohio Department of Natural Resources.*

FOREWORD

THE FOREST SERVICE of the U.S. Department of Agriculture conducts continuing forest surveys of all states to provide up-to-date information about the timber resources of the Nation. In the Northeastern Forest Experiment Station's territory, all states have been surveyed at least once; and several have been resurveyed. In the recently completed resurvey of Ohio, statistics about timber removals were gathered.

This report is the result of a 100-percent canvass of primary wood manufacturers in Ohio by the Station's Forest Survey project and the Ohio Department of Natural Resources. Pulpwood production data were gathered as part of the Station's annual survey of woodpulp producers of the Northeast.

During the canvass the Department of Natural Resources assembled a list of all known firms and later contacted in person all non-respondents. The Experiment Station mailed questionnaires to each firm, including possible out-of-state consumers of Ohio wood, and compiled data from the completed questionnaires.

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Primary Wood Products Output in OHIO—1966

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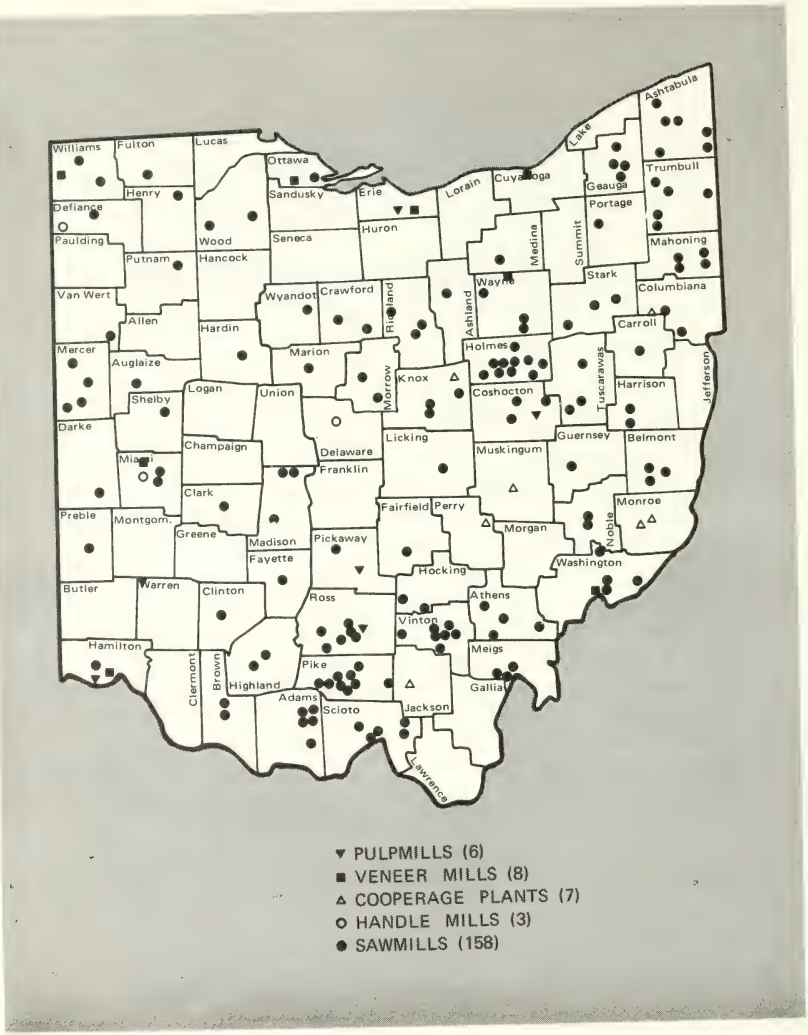


Figure 1.—The location of primary wood-using plants in Ohio. The numbers in parentheses indicate the number of plants operating in 1966. Sawmills include only operating mills that produce more than 0.5 million board feet.

Highlights

Over 96 million cubic feet of industrial roundwood were harvested from Ohio forests—up 119 percent from 1951.

Lumber production was at the highest level in past decade — nearly double that of 1960.

Internal industrial expansion caused pulpwood production to climb at an accelerated rate—up 20 percent from 1965.

Veneer log consumption went down 25 percent in the last decade, while the number of operating plants dropped by over 50 percent.

Plant residue use increased to 58 percent of the total available.

Six of the seven counties that produced over 15 million board feet of sawlogs in 1966 were in the Hill Country.

Trends in Total Output

Over 96 million cubic feet of industrial roundwood were cut from Ohio forests in 1966 (table 1). Sawlogs and pulpwood —by far the most important products—accounted for 90 percent of the total harvest.

Hardwoods accounted for 98 percent of the 1966 cut. However, small quantities of softwoods were harvested for sawlogs, pulpwood, posts, and mine timbers. All of the pole production came from softwoods.

Output of all timber products more than doubled in the past 15 years (table 2). The pulpwood manufacturing industry has been the most dynamic wood manufacturing industry in recent years. Pulpwood production between 1951 and 1966 increased 13.5 times. During the same period, sawlog production increased 83 percent. Output from softwoods increased at twice the rate of output from hardwoods.

Ohio Lumber and Sawlog Production Continued to Climb in 1966

Annual lumber production in Ohio has ranged from a high of nearly 1 billion board feet in 1899 to a low of 100 million

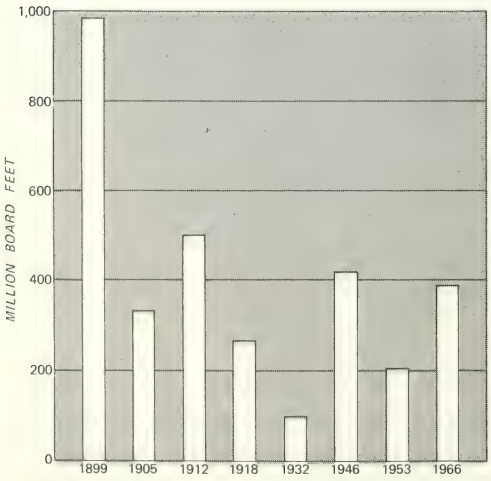
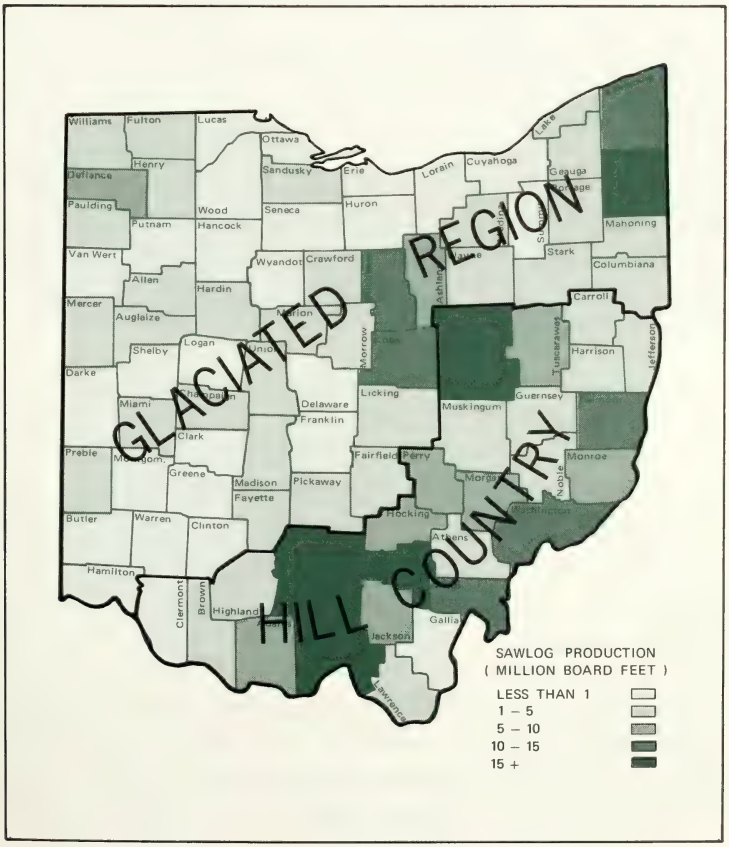


Figure 2.—Lumber production in Ohio for selected years, 1899-1966.

board feet during the depression years 1932-33 (fig. 2). More recently, highs of over 400 million board feet were recorded during World War II. During the last decade annual production climbed slowly from slightly over the 200 million board feet level to a high of 390 million board feet in 1966.

Ninety-nine percent—386 million board feet—of the sawlogs produced by Ohio timberlands in 1966 were hardwood (table 3). The oaks accounted for 43 percent of all sawlogs produced; red oak contributed nearly half of this volume. Yellow-poplar was the only other species that made up more than 10 percent of the total produced: nearly 44 million board feet of yellow-poplar sawlogs were produced during the year.

Figure 3.—Sawlog production in Ohio, by county, 1966.



Most of the sawlogs manufactured into lumber in 1966 came from Ohio forests (fig. 3). Only 7.5 million board feet of logs were purchased from other states for processing in Ohio. Red and white oaks and yellow-poplar were the major species purchased. Fifty-seven percent of the sawlog volume brought into the state came from West Virginia.

Six million board feet—1.5 percent of the total harvest — were shipped for processing to other states. Black walnut accounted for half of the volume shipped, and Indiana was the best customer.

Sixty-nine percent of Ohio's commercial forest land area and sawtimber volume is in the Hill Country. Six of the seven counties producing more than 15 million board feet of sawlogs in 1966 were located in this region.

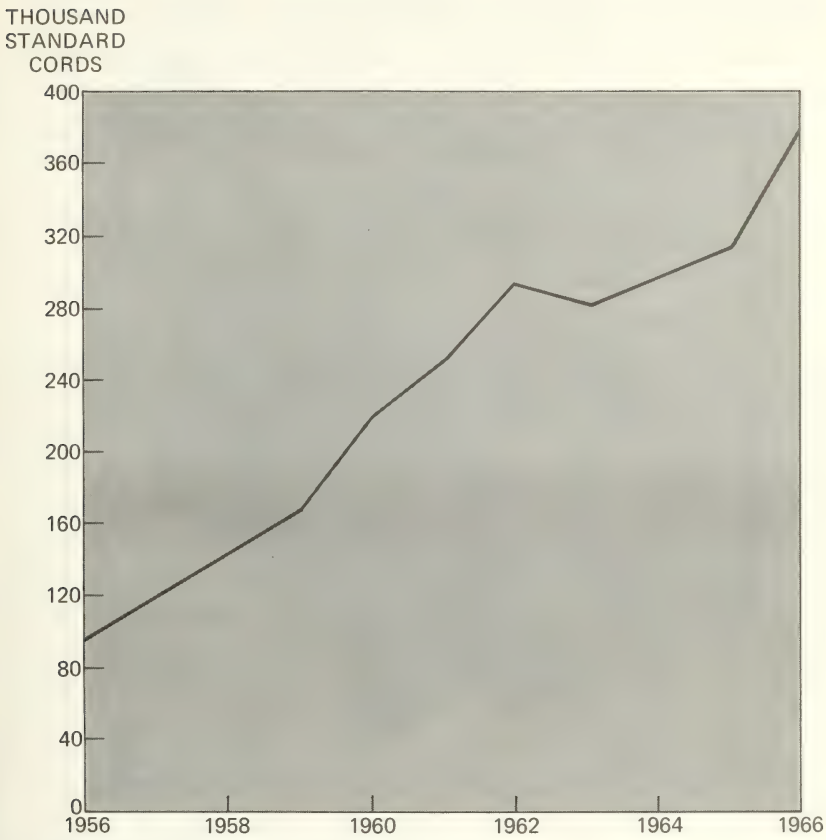
Industrial Expansion Creates Greater Pulpwood Demand

Pulpwood production in Ohio increased every year but one in the past decade (fig. 4), mainly because of the increasing demand for wood by the existing pulpmills in the State. In 1959, five woodpulp mills had a combined daily capacity of 635 tons; in 1966, the daily capacity of the six mills operating then had grown to 1,215 tons.

Ten years ago, nearly 99 percent of the pulpwood harvest came from hardwood roundwood. In 1966, even though the harvest had tripled in size, the relationship of hardwood to softwood cut remained virtually unchanged. Ninety-seven percent—326 thousand cords—of the 1966 harvest came from hardwoods. The small harvest of softwood roundwood—1,077 cords in 1956 and 10,400 cords in 1966—was shipped to mills in other states for processing.

No chips from plant residues were being processed in 1956. By 1961 chipped plant residues were being used in significant quantities in Ohio. Chip consumption jumped from 3 thousand cords in 1961 to 63 thousand cords in 1963. Ohio pulpmills

Figure 4.—Pulpwood production in Ohio, 1956-66.

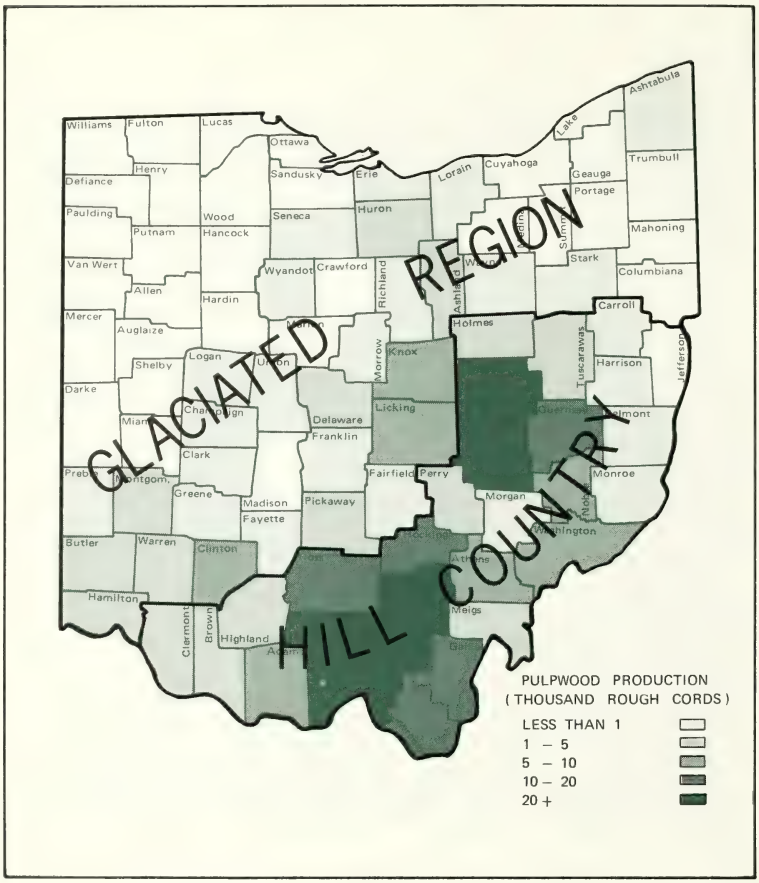


consumed 113 thousand cord-equivalents of chipped residues in 1966, 74 thousand cords of which were from other states.

Ohio has consistently obtained more pulpwood from neighboring states than it has shipped to them. In 1959 Ohio produced 84 percent of its total pulpwood requirements and brought in the remainder from Indiana, Kentucky, and West Virginia. In 1966 Ohio retained 97 percent of its roundwood harvest and all of its chipped residues for local consumption, and obtained 118.1 thousand cords of additional roundwood and woodchips from its neighbors.

Eleven counties (all in the Hill Country) produced more than 10,000 cords each of pulpwood bolts in 1966 (fig. 5). These

Figure 5.—Roundwood pulpwood production in Ohio, 1966.



11 counties produced 71 percent—240 thousand cords—of the state total (table 4).

Veneer Log Harvest Greater Than Local Needs

Ohio forests produced quantities of veneer logs in excess of local industrial needs during the past decade. While production decreased 23 percent during this period, consumption decreased 25 percent (fig. 6). Between 1958 and 1966 the small production excess remained more or less constant: production exceeded consumption by 19 percent in 1966 (tables 5 and 6).

The apparent ill-health of the veneer industry in Ohio can be traced to the type of product manufactured. Most manufacturers produce container veneer. Recently they have been under extreme pressure from competitors who use such substitute materials as plastics and corrugated paper in container construction. Between 1956 and 1966 more than half of the veneer plants went out of business.

White oak, hard maple, black walnut, elm, and beech accounted for 69 percent of the 1956 veneer-log harvest. Most of the white oak and black walnut logs were shipped to Indiana for processing into face veneer. In 1966, the same five species again accounted for 69 percent of the harvest.

The importance of black walnut as a preferred species of the Northeast hardwood veneer industry has increased over the years. In 1956, only 12 percent of the veneer log harvest in Ohio was from black walnut: in 1966, this species accounted for 38 percent of the harvest. Nearly three-fourths of the walnut volume harvested in 1966 was shipped to other states for processing.

During the decade 1956-66, white oak was replaced by beech as an important component of the annual veneer-log harvest.

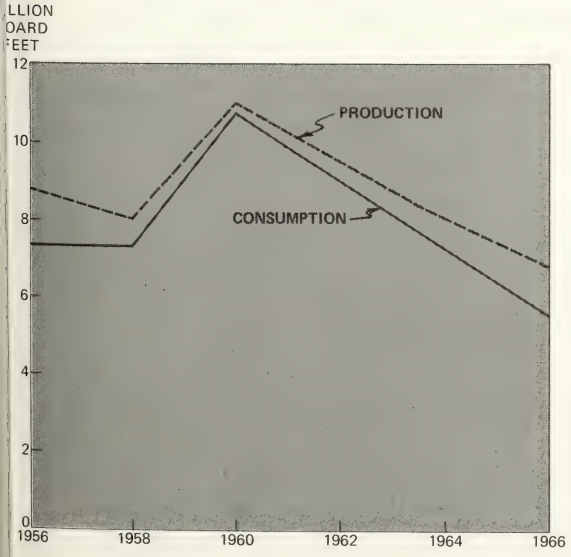


Figure 6.—Trends in veneer-log production and consumption in Ohio, 1956-66.

Although this switch in species resulted in a lower product value for the total cut because the white oak logs are sold for face veneer, manufacturers are now using a local species for container veneer that had previously been left uncut in the forest.

Cooperage and Handle Logs are High-Value Products

Cooperage logs and bolts are an insignificant part of Ohio's annual harvest. In 1966, the 11.0 million board-foot cut represented merely 1.8 percent of the harvest (table 7). However, this cut was valued at over half a million dollars at the stump, and close to a million dollars when delivered to the processing plant.

The trade differentiates between barrels constructed to hold liquids (tight cooperage) and those that hold dry materials (slack cooperage). White oak is normally used for tight cooperage; elm, gum, sycamore, and cottonwood are favored for slack cooperage. In 1958, 10 percent of Ohio's cooperage log harvest came from species used in slack cooperage. By 1966, slack cooperage production had fallen to zero because of the competition from new packaging products such as fiber boxes and drums, and paper and cotton bags. All of the 1966 harvest was from white oak.

Because most cooperage mills are portable, they tend to locate close to extensive white oak sawtimber stands. Therefore, there are very few interstate shipments of cooperage logs. During the past decade more than 90 percent of the material used in Ohio cooperage mills came from Ohio forests.

Five handle mills cut 5.2 million board feet of logs and bolts into handles and handle blanks during 1966. Consumption was up 69 percent from 1962. Over 99 percent of the handle bolts were ash, for use in shovel and rake handles.

Plant Residues Find Many Uses

More than 34 million cubic feet of wood residues were generated by Ohio primary wood manufacturers in 1966. Fifty-eight

percent—nearly 20 million cubic feet—of these residues were used (tables 8 and 9).

Thirty-five percent of the residues used went to Ohio fiber and pulpmills. The portion going to the pulpmills equaled 10 percent of their total receipts.

For many years agricultural bedding has constituted a major use of fine material (sawdust and shavings). In 1966, 41 percent of the fine material available was used; and of this, 95 percent or 5.4 million cubic feet went into agricultural bedding.

Much of the coarse residues (slabs and edgings) were converted to pulp chips or were used as domestic or industrial fuel. Charcoal plants in Ohio now use coarse plant residues almost exclusively as an inexpensive raw material.

■

Table 1.—*Volume of industrial roundwood production in Ohio, 1966*[1]

Product	Volume in standard units				Roundwood volume		
	Standard units	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
					Thousand cubic feet		
Sawlogs	M board feet[2]	389,731	3,406	386,325	59,960	521	59,439
Pulpwood	Standard cords	336,700	10,400	326,300	26,936	832	26,104
Veneer logs	M board feet[2]	6,712	—	6,712	1,032	—	1,032
Cooperage logs	M board feet[2]	11,041	—	11,041	1,697	—	1,697
Poles	M pieces	5	5	—	12	12	—
Posts	M pieces	1,440	190	1,250	866	146	720
Mine timbers	M cubic feet	1,010	203	807	1,010	203	807
Miscellaneous products[3]	M cubic feet	5,068	—	5,068	5,068	—	5,068
Total	—	—	—	—	96,581	1,714	94,867

[1] Does not include fuelwood or metallurgical wood.
[2] International 1/4-inch rule.
[3] Includes piling, handle stock, miscellaneous dimension stock, and hewn ties.

Table 2.—*Timber products output from roundwood for Ohio, 1951 and 1966*

Product	All species			Softwoods			Hardwoods		
	1951	1966	Change	1951	1966	Change	1951	1966	Change
	Million cubic feet		*Percent*	*Million cubic feet*		*Percent*	*Million cubic feet*		*Percent*
Sawlogs	32.8	60.0	+83	0.4	0.5	+25	32.4	59.5	+84
Pulpwood	2.0	26.9	+1,245	(1)	.8	+700	2.0	26.1	+1,205
Veneer logs	1.8	1.0	—43	—	—	—	1.8	1.0	—43
Cooperage logs	1.9	1.7	—11	—	—	—	1.9	1.7	—11
Poles and posts	3.6	.9	—75	—	.2	—	3.6	.7	—81
Mine timbers	1.4	1.0	—29	—	.2	—	1.4	.8	—43
Miscellaneous products[2]	.6	5.1	+750	(1)	—	—	.6	5.1	+750
Total	44.1	96.6	+119	0.4	1.7	+325	43.7	94.9	+117

[1] Less than 50,000 cubic feet.
[2] Includes piling, handle stock, miscellaneous dimension stock, and hewn ties. Does not include fuelwood or metallurgical wood.

Table 3.—*Ohio sawlog production by species, 1966*

Species	Production	
	Million board feet	*Percent of total*
Softwoods:		
Pine	1.2	0.3
Other softwoods	2.2	.6
All softwoods	3.4	0.9
Hardwoods:		
Ash	19.8	5.1
Basswood	7.8	2.0
Birch	1.2	.3
Beech	17.7	4.5
Black cherry	7.5	1.9
Elm	13.9	3.6
Gum	2.8	.7
Hickory	14.7	3.8
Hard maple	27.7	7.1
Soft maple	27.0	6.9
White oak	50.8	13.1
Chestnut oak	14.1	3.6
Red oak	78.1	20.0
Black oak	16.0	4.1
Other oak	8.9	2.3
Yellow-poplar	43.6	11.2
Walnut	19.1	4.9
Other hardwoods	15.6	4.0
All hardwoods	386.3	99.1
All species	389.7	100.0

Table 4.—*Pulpwood production from roundwood, by species groups and counties, Ohio, 1966*

[In thousands of standard cords][1]

County	All species	Softwoods	Hardwoods
Adams	6.6	—	6.6
Ashland	1.7	0.1	1.6
Ashtabula	.5	—	.5
Athens	8.0	.1	7.9
Belmont	.1	—	.1
Brown	2.4	([2])	2.4
Butler	1.4	([2])	1.4
Carroll	([2])	—	([2])
Champaign	.1	—	.1
Clark	.2	—	.2
Clermont	1.8	([2])	1.8
Clinton	5.6	.1	5.5
Coshocton	31.1	—	31.1
Delaware	1.6	—	1.6
Erie	.8	—	.8
Fairfield	.9	—	.9
Fayette	.3	—	.3
Franklin	.5	—	.5
Gallia	12.2	5.4	6.8
Greene	.9	([2])	.9
Guernsey	11.5	—	11.5
Hamilton	1.1	—	1.1
Harrison	.2	—	.2
Highland	4.9	.1	4.8
Hocking	18.2	—	18.2
Holmes	3.7	—	3.7
Horon	1.4	—	1.4
Jackson	32.1	.7	31.4
Knox	5.6	—	5.6
Lawrence	19.9	1.0	18.9
Licking	9.6	—	9.6
Logan	.1	—	.1
Lorain	.9	—	.9
Meigs	3.5	1.9	1.6
Monroe	.5	—	.5
Montgomery	1.5	([2])	1.5
Morgan	.2	—	.2
Morrow	.1	—	.1
Muskingum	20.9	—	20.9
Noble	9.6	—	9.6
Perry	4.8	—	4.8
Pickaway	1.0	—	1.0
Pike	26.6	([2])	26.6

CONTINUED

Table 4.—Continued

County	All species	Softwoods	Hardwoods
Preble	.8	.1	.7
Richland	.3	—	.3
Ross	14.2	—	14.2
Scioto	29.2	.1	29.1
Seneca	.6	—	.6
Stark	.4	—	.4
Tuscarawas	4.5	—	4.5
Union	.1	—	.1
Vinton	24.3	(2)	24.3
Warren	1.2	.1	1.1
Washington	6.3	.7	5.6
Wayne	.1	—	.1
Wyandot	.1	—	.1
Total	336.7	10.4	326.3

[1] Rough wood basis.
[2] Less than 50 cords.

Table 5.—*Production of veneer logs and bolts in Ohio, by species and state where used, 1966*[1]

[In thousands of board feet, International ¼-inch rule]

Species	Indiana	Kentucky	Ohio	All states
Ash	33.0	—	—	33.0
Basswood	—	—	64.7	64.7
Beech	—	—	872.3	872.3
Cherry	33.0	—	—	33.0
Elm	—	—	480.1	480.1
Gum	—	—	314.9	314.9
Hickory	46.0	—	129.6	175.6
Hard maple	108.0	—	360.5	468.5
Soft maple	—	—	259.4	259.4
White oak	264.0	—	—	264.0
Red oak	171.0	—	60.0	231.0
Yellow-poplar	188.0	—	269.6	457.6
Walnut	1,472.0	418.8	670.8	2,561.6
Other hardwoods[2]	2.0	—	494.0	496.0
All species	2,317.0	418.8	3,975.9	6,711.7

[1] These statistics reflect veneer log receipts at domestic veneer plants, and therefore do not include export logs handled in log concentration yards.
[2] Includes sycamore and cottonwood.

Table 6.—*Consumption of veneer logs and bolts in Ohio, by species and state of origin, 1966*[1]

[In thousands of board feet, International ¼-inch rule]

Species	Illinois	Indiana	Kentucky	Michigan	Ohio	Pennsylvania	West Virginia	All states
Basswood	—	—	—	—	64.7	—	—	64.7
Beech	—	—	—	—	872.3	—	—	872.3
Elm	—	—	—	—	480.1	—	—	480.1
Gum	—	—	—	—	314.9	—	—	314.9
Hickory	—	—	—	—	129.6	—	—	129.6
Hard maple	—	108.0	—	216.0	360.5	—	12.0	696.5
Soft maple	—	—	—	—	259.4	—	—	259.4
Red oak	—	—	—	—	60.0	—	—	60.0
Yellow-poplar	—	—	—	—	269.6	—	—	269.6
Walnut	92.9	701.0	280.6	—	670.8	59.9	201.6	2,006.8
Other hardwoods[2]	—	—	—	—	494.0	—	—	494.0
All species	92.9	809.0	280.6	216.0	3,975.9	59.9	213.6	5,647.9

[1] These statistics reflect veneer-log receipts at domestic veneer plants, and therefore do not include export logs handled in log-concentration yards.

[2] Includes sycamore and cottonwood.

Table 7.—*Production of cooperage logs and bolts in Ohio, by selected years*

Year	Active stave mills	Volume produced
	Number	*Million board feet*[1]
1958	10	8.6
1960	11	13.6
1962	10	12.4
1964	12	16.0
1966	7	11.0

[1] International ¼-inch rule.

Table 8.—*Total residues from primary wood-processing plants by industrial source and type of residue, and by species groups, Ohio, 1966*

[In thousands of cubic feet]

Industrial source[1] and type of residue	All species	Softwoods	Hardwoods
Lumber industry:			
Coarse[2]	19,487	171	19,316
Fine[3]	12,861	112	12,749
Total	32,348	283	32,065
Veneer industry:			
Coarse	116	—	116
Fine	116	—	116
Total	232	—	232
Other primary industries:			
Coarse	988	—	988
Fine	580	—	580
Total	1,568	—	1,568
All industries:			
Coarse	20,591	171	20,420
Fine	13,557	112	13,445
Total	34,148	283	33,865

[1] Excludes woodpulp industry.
[2] Coarse residues include slabs, edgings, trimmings, and other material considered suitable for chipping.
[3] Fine residues include sawdust, shavings, and other material unsuitable for chipping.

Table 9.—*Volume of byproducts from primary wood-processing plants, by source, type of use, and species groups, Ohio, 1966*

[In thousands of cubic feet]

Source[1] industry	Type of use	All species	Softwoods	Hardwoods
Lumber	Fiber[2]	6,973	13	6,960
	Fuel[3]	4,962	52	4,910
	Agricultural bedding	5,182	49	5,133
	Other[4]	1,651	—	1,651
	All uses	18,768	114	18,654
Veneer	Fiber	74	—	74
	Agricultural bedding	5	—	5
	Other	44	—	44
	All uses	123	—	123
Other industries	Fiber	43	—	43
	Fuel	649	—	649
	Agricultural bedding	183	—	183
	Other	171	—	171
	All uses	1,046	—	1,046
All industries	Fiber	7,016	13	7,003
	Fuel	5,685	52	5,633
	Agricultural bedding	5,370	49	5,321
	Other	1,866	—	1,866
	Total	19,937	114	19,823

[1] Excludes woodpulp industry.

[2] Includes 3,104 M cubic feet of residues for pulp along with residues for wood fiber mills.

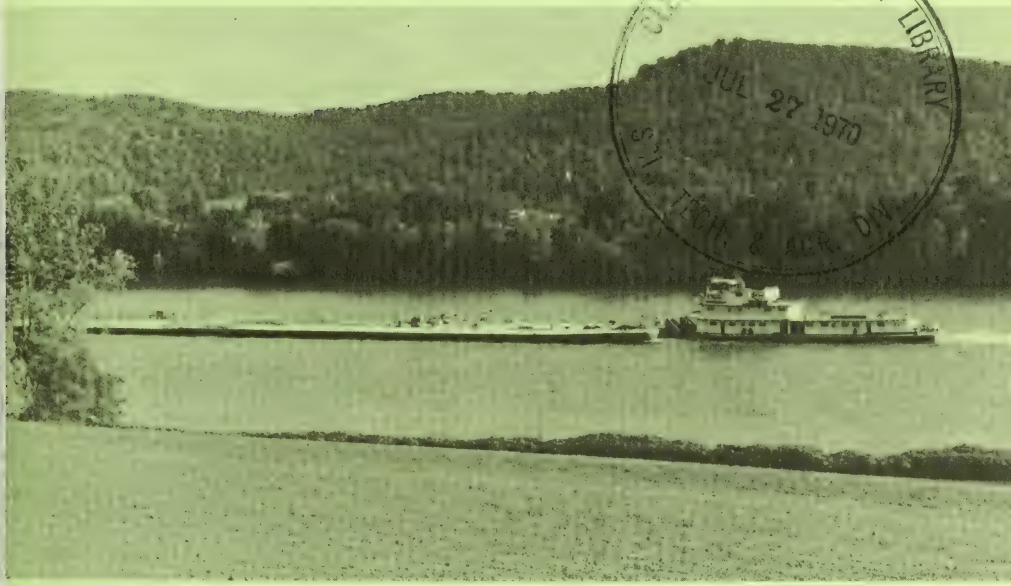
[3] Includes all residues used as domestic or industrial fuel whether sold or given away.

[4] Includes residues used for charcoal, small dimension stock, and specialty items.

■

THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

The TIMBER RESOURCES of OHIO



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U.S.D.A. FOREST SERVICE RESOURCE BULLETIN NE-19
1970

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

FOREWORD

UNDER THE AUTHORITY of the McSweeney-McNary Forest Research Act of May 22, 1928, and subsequent amendments, the Forest Service, U. S. Department of Agriculture, conducts a series of continuing forest surveys of all states to provide up-to-date information about the forest resources of the Nation.

A resurvey of the timber resources of Ohio was made in 1966 and 1967 by the Northeastern Forest Experiment Station, approximately 16 years after the initial forest survey.

In this resurvey, the State of Ohio provided an appropriation of $75,000 to intensify the forest survey in the heavily forested portions of the State. Also, the Ohio Department of Natural Resources, Bureau of Forestry and Reclamation, assisted in the collection of data on timber removal and timber-products output, as well as through consultation with Forest Service personnel.

Carl E. Mayer, project leader, directed the resurvey. Joseph E. Barnard was in charge of computing and tabulating all inventory data, including those for the Wayne National Forest, which were collected by personnel of the Eastern Region of the U. S. Forest Service. Paul S. DeBald and James T. Bones collected and compiled the data on timber removals, with the assistance of the Ohio Division of Forestry and Reclamation personnel. Teresa M. Bowers assisted with the compilations and checked the statistical data. The field work was completed in December 1967.

The Agricultural Stabilization and Conservation Service provided up-to-date aerial photographs for use in this resurvey.

This report summarizes the timber-resource situation and the changes that have taken place since the initial survey. Trends in the supply of timber for forest-based industries are pointed out, and projections of future timber supply are made.

In this survey, some of the initial ground plots were remeasured to provide estimates of net annual timber growth and estimates of land-use change, and to update the initial forest-inventory volume. To develop an independent second estimate, newly established and previously unmeasured ground plots were measured. These two estimates were weighted and combined to provide the current estimates of forest area and timber volume.

Sampling errors, which indicate the reliability of the estimates, are shown for most of the totals of breakdowns of the new estimates. Users of these resource data are cautioned to read carefully the definitions of forest-survey terms and the section on the reliability of the estimates in the appendix of this report.

The TIMBER RESOURCES of OHIO

by Neal P. Kingsley
Carl E. Mayer

The Authors

NEAL P. KINGSLEY, research forester, received his bachelor's degree in forestry from the University of New Hampshire in 1961 and his master's degree in forest economics from the same university in 1963. He joined the Northeastern Forest Experiment Station in August 1962 and has been stationed since that time at Upper Darby, Pennsylvania, where he is resource analyst in the Experiment Station's Forest Survey unit.

CARL E. MAYER is the Forest Survey project leader at the Northeastern Forest Experiment Station. He received his bachelor's degree in forestry from Iowa State University in 1943. After military service as an officer in the U. S. Marine Corps, he spent 12 years in forest-survey work at the Pacific Northwest Station in Portland, Oregon. He transferred to the Northeastern Station in 1958 and since that time has directed the Forest Survey of the Northeastern 14-state area.

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IMPORTANT FINDINGS

IN THE 16 years that have elapsed since the report on the first forest survey of Ohio was published in 1952, a number of important changes have taken place. Here briefly are some of the more important findings of this second forest survey of the Buckeye State:

- Commercial forest land in Ohio now totals 6.3 million acres—up 17 percent from 1952.

- Farmers now own 42 percent of the forest land (56 percent in 1952). Other private owners own 52 percent (38 percent in 1952). Only 6 percent is publicly owned.

- An unusually high proportion of Ohio's forest land is in sapling-and-seedling stands—56 percent of the commercial forest land.

- The area in the oak-hickory forest type declined slightly, while the area in the elm-ash-red maple type was unchanged. But the area in maple-beech-birch, oak-pine, and softwoods increased substantially.

- The volume of growing stock in Ohio increased 31 percent. In 1952 growing stock totaled 3.2 billion cubic feet; by 1968 it totaled nearly 4.2 billion.

- The volume of sawtimber in Ohio increased 30 percent. In 1952 sawtimber totaled 11.2 billion board feet; by 1968 it totaled 14.6 billion.

- Only one-third of Ohio's sawtimber is in grade 1 and 2 sawlogs.

- Net annual growth exceeds timber removals. Growth equals 3.2 percent of the growing-stock inventory while removals equal 1.7 percent.

- By 1966 the output of timber products from Ohio's forests had risen to 119.4 million cubic feet from 64.5 million in 1952.

- A better distribution of stand-size classes is a major timber management need in Ohio.

THE BACKGROUND

Ohio Once 95 Percent Forested

French Jesuits, trappers, and explorers were probably the first white men to venture into what is now Ohio. For a century France and Britain battled for control of the region. Finally the British victory of 1763 put Ohio in the domain of George III. But Ohio was not to remain long under Crown rule. After the victory of 1763, American colonists began slowly moving into the region. After the Revolution, a destitute new nation repaid many of its fighting men with grants to land in the Ohio country; and the pace of migration began to quicken. But this new land was still peopled by hostile Indian tribes until in 1795 "Mad

Anthony" Wayne in the Treaty of Green Ville secured southern and central Ohio from the Indian menace.

Ater the Treaty of Green Ville, settlement began in earnest. Settlers swarmed over the mountains and up the river valleys. In 1803, when Ohio was admitted to the Union, the State's population was about 50,000. Seven years later, in 1810, it totaled 230,760. In the following decade, Ohio's population rose 152 percent to 581,434. By 1850 nearly 2 million people lived in Ohio.

When the earliest settlers arrived in Ohio, 95 percent of the land was covered by mature hardwood forests. By 1940 only about 12 percent of Ohio was forested (fig. 1).

The first settlers of Ohio were mostly farmers. The land they found was fertile and well suited to agriculture, but it was covered by dense forests. So it was necessary to clear the land to make way for farming.

The most widespread forest type was the beech-maple type, which extended in a broad band from the northeast to the southwest. Other important types were oak-hickory in the southeast and elm-ash-red maple, which was scattered in wet areas and up stream valleys. It is estimated that some stands contained as much as 45 thousand board feet per acre, but they probably averaged about 12 thousand board feet.

The trees in these forests were generally mature, and very large

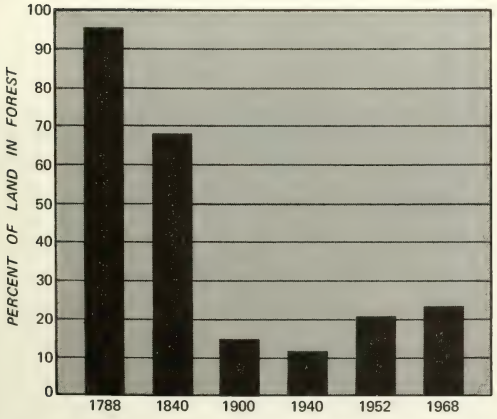


Figure 1. — Forest land area of Ohio as a percentage of all land for selected years 1788 to 1968.

specimens were probably common. The following account by one Norris Birkbank describes some of these large trees.

> "Yesterday, June 18, 1817, I measured a walnut almost 7 feet in diameter, clean and straight as an arrow. The white oak is the glory of the upland forest. I measured a white oak by the roadside which at 4 feet from the ground was 6 feet in diameter, and at 75 feet it measured 9 feet around. Before we entered on the flat country were some hills (near Chillicothe) covered with the grandest white oak, I suppose, in America. They measured 14 or 15 feet in circumference, their straight stems rising without a branch to 75 or 80 feet — thousands of them."

When we think about the removal of such forests, we may well have a feeling of regret. Yet agriculture was the means of survival to Ohio's early settlers; and these rich and fertile soils helped Ohio to become an agricultural giant among the states in the mid-1800's. So Ohio could not remain densely forested and become an economically healthy and well-developed state—at least not in the world of the nineteenth century.

Two Distinct Regions

Physiographically, Ohio is divided into two regions: the Hill Country, which covers the southeastern one-third of the State; and the Glaciated Region, which covers the remainder of the State. Throughout this report we will make comparisons and point out contrasts between these two regions (figs. 2 and 3).

Figure 2.—The Hill Country—Scioto County.

Figure 3.—The Glaciated Region—Madison County.

The Hill Country.—The Hill Country is that region of the State that was not covered by the glaciers. This is a region of winding rivers, steep hills, and narrow valleys. There are few extensive, well-organized ridges. The eastern portion is part of the Allegheny Plateau, and in a few places it rises above 1,400 feet in elevation. The southern portion is the edge of the Appalachian Plateau and Mountains.

The Hill Country comprises the East-Central, Southeastern, and South-Central Units (fig. 4).

The Glaciated Region.—This region covers the remainder of the State. This region had been planed into flat or rolling plains by the movement of glacial ice. The western portion is a rolling plain, which reaches an elevation of 1,550 feet above sea level in Logan County. Northwestern Ohio, also part of the Glaciated Region, is a flat lake plain, which was once the bottom of a body of water much larger than the present Lake Erie.

The Northeastern and the Western Units make up the Glaciated Region.

Figure 4.—The forest-survey units of Ohio, 1968.

FOREST AREA

Forest Area Up 17 Percent Since 1952

The commercial forest land area of Ohio increased 17 percent between 1952 and 1968. In 1968 commercial forest land in Ohio totaled 6,329,200 acres, compared with 5,396,000 in 1952, a gain of 933,200 acres. Commercial forest land now accounts for 24 percent of Ohio's total land area, compared to 21 percent in 1952. Noncommercial forest land increased by 52 percent, but still accounts for less than 1 percent of the total land area of Ohio.

The increase in commercial forest land was not evenly distrib-

uted over the State. The Hill Country showed a 32-percent increase since 1952. Here commercial forest land area rose from 3,310,000 acres (38 percent of the area in 1952) to 4,381,300 acres (50 percent of the area in 1968). In contrast, the Glaciated Region lost nearly 7 percent. Here commercial forest land totaled 1,947,900 acres in 1968, down from 2,086,000 acres in 1952.

The Hill Country covers only slightly more than one-third of Ohio's total land area. This fact, coupled with the 32-percent increase in commercial forest land in the Hill Country, sharpens the contrast between the Hill Country, an essentially forested region, and the Glaciated Region, an open and predominantly agricultural area.

The Glaciated Region contains most of Ohio's major urban areas. Like most urban areas, those in Ohio have been spreading out from the core cities. This urban sprawl, plus the construction of several major highways, has served to offset any increase in the forest land area of the Glaciated Region.

By comparing the area of commercial forest land in the two regions in 1952 and 1968 it is possible to see just where forest land has increased most. The most substantial and significant increase occurred in the East-Central Unit of the Hill Country. The area of commercial forest land in this unit rose from 29 percent of the land area in 1952 to 46 percent in 1968.

Of Ohio's 88 counties, 33 are less than 10 percent forested. All of these counties are in the Western Unit. No county outside the Hill Country, except Geauga County is more than 30 percent forested (fig. 5). Only 15 Ohio counties are more than 60 percent forested.

Area Owned by Farmers Drops

The percentage of commercial forest land owned by farmers dropped 15 percent. In 1952 farmers owned 3,047,000 acres—about 56 percent of Ohio's commercial forest land. By 1968 this percentage had dropped to 42 percent or 2,687,900 acres.

In the Hill Country 38 percent—1,673,000 acres—of commercial forest land is owned by farmers. By contrast, in the Glaciated Region 52 percent of that area—1,014,900 acres—is owned by farmers.

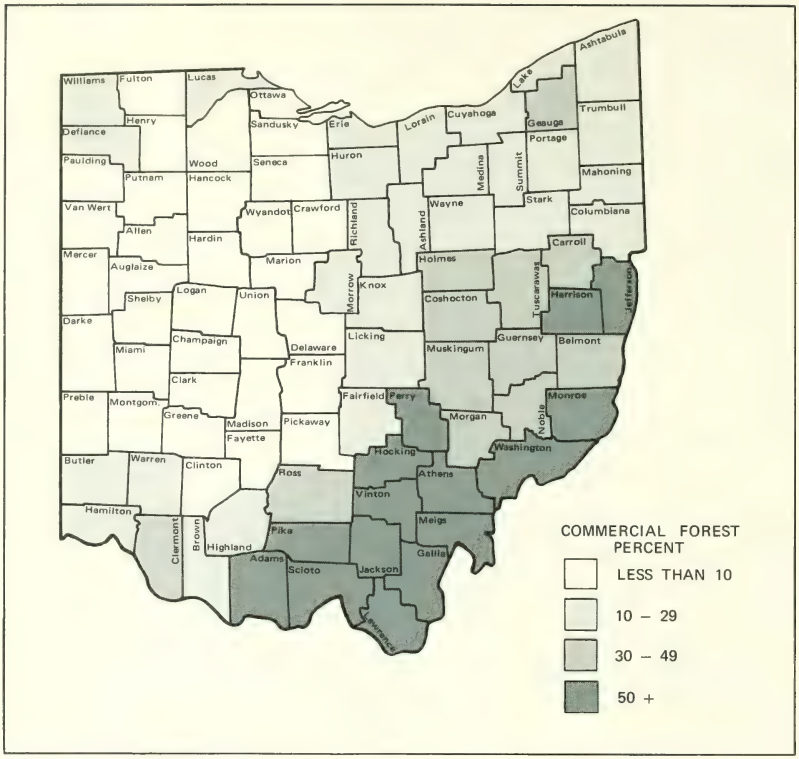


Figure 5.—Twenty-six of Ohio's 88 counties have 30 percent or more of their land area in commercial forest land.

The 14-percent decline in farmer-owned forest was offset by a 14-percent increase in other private ownerships. Other private commercial forest land totaled 3,293,600 acres (52 percent of the total in 1968), up from 2,052,000 acres (38 percent of the total in 1952). Publicly owned commercial forest land increased from 297,000 acres in 1952 to 347,700 acres in 1968, but remained at 6 percent of the total commercial forest land.

Forest industries owns 126,800 acres of commercial forest land in Ohio. Most of this, 98,300 acres—2 percent of the total commercial forest land—is owned by the pulp and paper industry. The remaining 28,500 acres are owned by lumber companies and a variety of other wood-using industries. All the forest-industry land is in the Hill Country.

Other private ownerships make up 55 percent—2,404,400 acres—of commercial forest land in the Hill Country and less than 46 percent—889,200 acres—in the Glaciated Region. Publicly owned commercial forest land in the Hill Country totals 303,900 acres, or just under 7 percent of that region's commercial forest land. In the Glaciated Region public ownerships cover slightly more than 2 percent—43,800 acres.

A High Proportion of Area in Sapling Seedling Stands

Nearly 56 percent of Ohio's commercial forest acreage is covered by sapling-and-seedling stands (fig. 6)[1]. One reason for

[1] Stand-size class was determined by basal-area stocking in this survey. In the initial survey of Ohio, in 1952, stand-size class was determined by volume per acre. For this reason the stand-size class data presented in this report are not directly comparable with those presented in the report of the 1952 survey. Classification of stand-size by basal area gives a more reliable estimate for timber-management purposes. For a more detailed discussion of stand-size classification see the appendix.

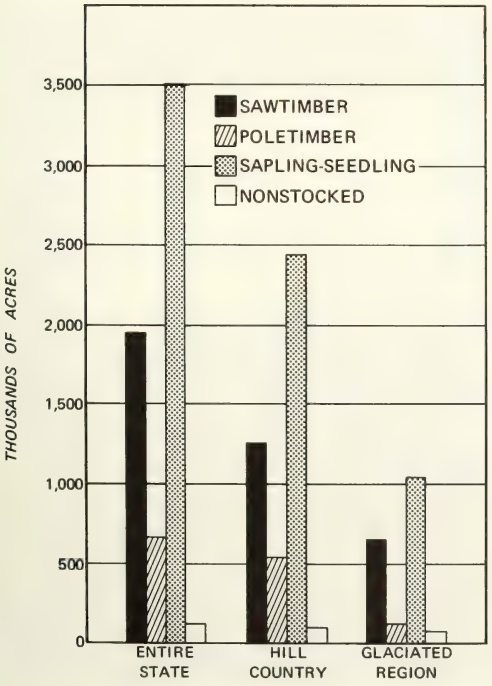


Figure 6. — Sapling and seedling stands cover nearly 56 percent of the commercial forest land in Ohio.

such a large proportion of area in sapling-and-seedling stands is the substantial increase of over 933 thousand acres in commercial forest land since 1952. Most of this new acreage is classed as nonstocked or sapling-and-seedling stands. Very little of it has had time to develop into poletimber-size stands (fig. 7).

About 31 percent of Ohio's commercial forest land is in sawtimber-size stands. However, this differs between the two major regions of the State. Sawtimber stands cover about 35 percent of the commercial forest land in the Glaciated Region but only 29 percent in the Hill Country. This lower proportion in the Hill Country is the result of more intensive timber cutting in that region.

Another important reason for the large proportion of sapling-and-seedling stands is past timber-harvesting practices. Many stands in Ohio have been high-graded—that is, the best timber was removed, leaving the poorer timber. Or they were cut by the so-called commercial clearcutting method—that is, the area was clearcut but the poorest trees were left untouched. Thus many young stands today are overtopped by low-quality growth, much of it classed as nongrowing-stock trees, which serve to inhibit growth and keep these stands in the sapling-and-seedling classification for a longer than normal period. The magnitude of this problem is discussed later.

Figure 7.—Three typical hardwood stands: sawtimber, poletimber, and sapling and seedling.

Area in Larger Volume Stands Declines

A comparison of the area of commercial forest land in three stand-volume classes for the two forest surveys (1952 and 1968) shows that the proportion of area in stands containing less than 1,500 board feet covered 2,717,000 acres (50.4 percent of all commercial forest land). In 1968 such stands covered 3,079,900 acres (48.6 percent of the total area in 1968).

Changes have taken place in the other two classes (fig. 8). The area in stands of more than 5,000 board feet per acre fell from 1,581,000 acres (29 percent of the State's commercial forest land) to 928,400 acres (15 percent). The area in stands of 1,500 to 5,000 board feet per acre increased from 1,098,000 acres (20 percent of the area) to 2,320,900 acres (37 percent of the area in 1968).

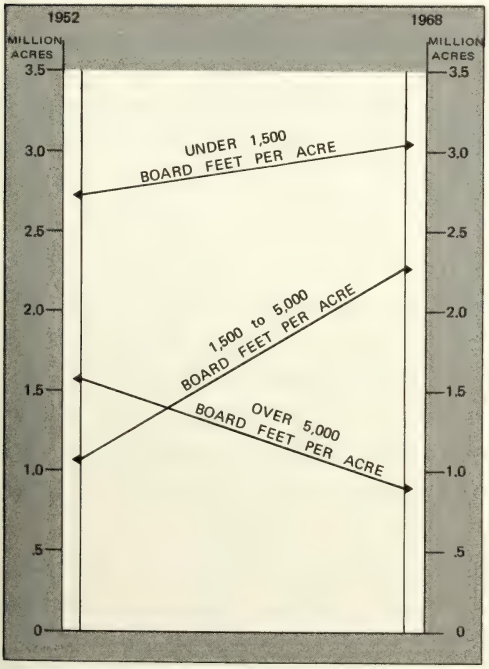


Figure 8.—The area in stands of more than 5,000 board feet per acre dropped considerably while the other two classes increased in area from 1952 to 1968.

Hardwood Area up 15 Percent; Softwood Area up 141 Percent

Hardwood forest types cover 6,049,700 acres—nearly 96 percent of Ohio's commercial forest land. This is an increase of nearly 770 thousand acres or 15 percent more than the 1952 total of 5,280,000 acres. Softwood types, which cover only 279,500 acres—4 percent of the commercial forest land—showed a 141-percent increase since 1952. In 1952 all softwood types totaled 116,000 acres—only 2 percent of the commercial forest land. This large increase in softwood types is the result of extensive tree planting in the State since 1952.

The most extensive, and economically the most important, major forest type in Ohio is oak-hickory. In 1952 the oak-hickory type covered 3,133,000 acres (58 percent of Ohio's commercial forest land) and in 1968 it covered 2,953,800 acres (47 percent). In the Hill Country the area in oak-hickory failed to keep pace with the general increase in forest land. Though the area of commercial forest land in the Hill Country in 1968 was about 32 percent greater than in 1952, the total area in oak-hickory was unchanged. In the Glaciated Region the decrease in the area of oak-hickory exceeded the decrease in the area of all commercial forest land. Though commercial forest land in 1968 was 7 percent less than in 1952, the area in oak-hickory was 21 percent less.

The second most extensive forest type in Ohio, elm-ash-red maple (or elm-ash-cottonwood) increased in acreage, but declined as a percentage of all forest land. In 1952 this type covered 1,334,000 acres (25 percent of Ohio's commercial forest land) and in 1968 it covered 1,376,000 acres (22 percent). This wet-site type probably has long covered most sites to which it is suited. For this reason any major changes in its extent appear to be unlikely.

Although the two most extensive types declined in area, the other types all increased significantly; so much so, in fact, that these increases offset the decline of the largest types.

The area covered by the maple-beech-birch type in 1968 was 79 percent greater than its area in 1952. In 1952 this type covered 642,000 acres: by 1968 it covered 1,151,600 acres. The increase

in this type was not limited to either major region of the State. In the Hill Country maple-beech-birch rose from about 271,000 acres in 1952 to 680,900 acres in 1968, a 151 percent increase. In the Glaciated Region it increased from nearly 371,000 acres in 1952 to 470,700 acres in 1968, a gain of 27 percent. This type, which is usually found on deep, fertile, well-drained soils, is potentially a very valuable forest type in Ohio because of the presence of such high-value species as sugar maple, black cherry, and black walnut. However, because past cutting practices have often concentrated on removing the high-value species, many stands of this type contain as much as 70 percent beech. Beech is one of the least valuable species found in Ohio.

The oak-pine type, although it is relatively less important in area covered, increased more than four times between 1952 and 1968. In 1952 this type covered 106,000 acres, but by 1968 it had increased to 478,700 acres. The other hardwood types, which include oak-gum and aspen, covered 65,000 acres in 1952 and now cover 89,600 acres.

TIMBER VOLUME

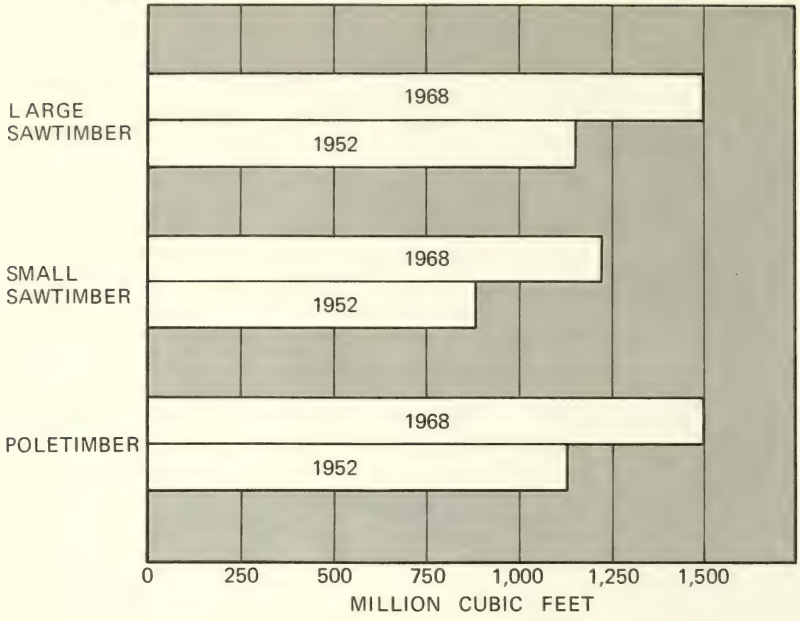
Volume of Growing Stock Increased More Than Forest Area

While the total area of Ohio's commercial forest land increased 17 percent from 1952 to 1968, the volume of growing stock gained more than 31 percent. In 1952 Ohio's growing stock totaled 3.2 billion cubic feet; by 1968 the total had risen to nearly 4.2 billion.[2]

Both of the State's major regions gained 31 percent in timber volume. In 1968 the volume of growing stock in the Hill Country totaled 2.9 billion cubic feet, while the volume in the Glaciated Region totaled 1.3 billion cubic feet.

[2] Because forest-survey methods and definitions changed between 1952 and 1968, direct comparisons of volumes between surveys is not possible. Therefore, the 1952 estimates presented in this report have been adjusted to the 1968 forest-survey standards. A complete discussion of these differences is presented in the appendix.

Figure 9.—The trend of growing stock in Ohio, by tree size class, 1952-68.



This increase in timber volume caused only minor shifts in the average size of trees in the State (fig. 9). In 1952 and in 1968 about 36 percent of the State's growing-stock volume was in poletimber trees. The percentage in small sawtimber-size trees rose from 27 percent in 1952 to 29 percent in 1968 while the percentage in large sawtimber declined from 37 percent to 35 percent.

In addition to the 4,180,900 cubic feet of growing stock in Ohio's forests, there is 675,300 cubic feet of non-growing stock material. This volume is found in rough and/or rotten trees that are too poor in quality to be classed as growing-stock trees. Much of this material can be used by industries that use timber as a source of wood fiber. More important, this means that of the total of 4,856,200 cubic feet of timber in Ohio's forests, 675,300 cubic feet (14 percent) is in trees that are too poor to be considered growing-stock trees. Figure 10 shows the volume and percentage of all timber in sawtimber, poletimber, rough, and rotten trees.

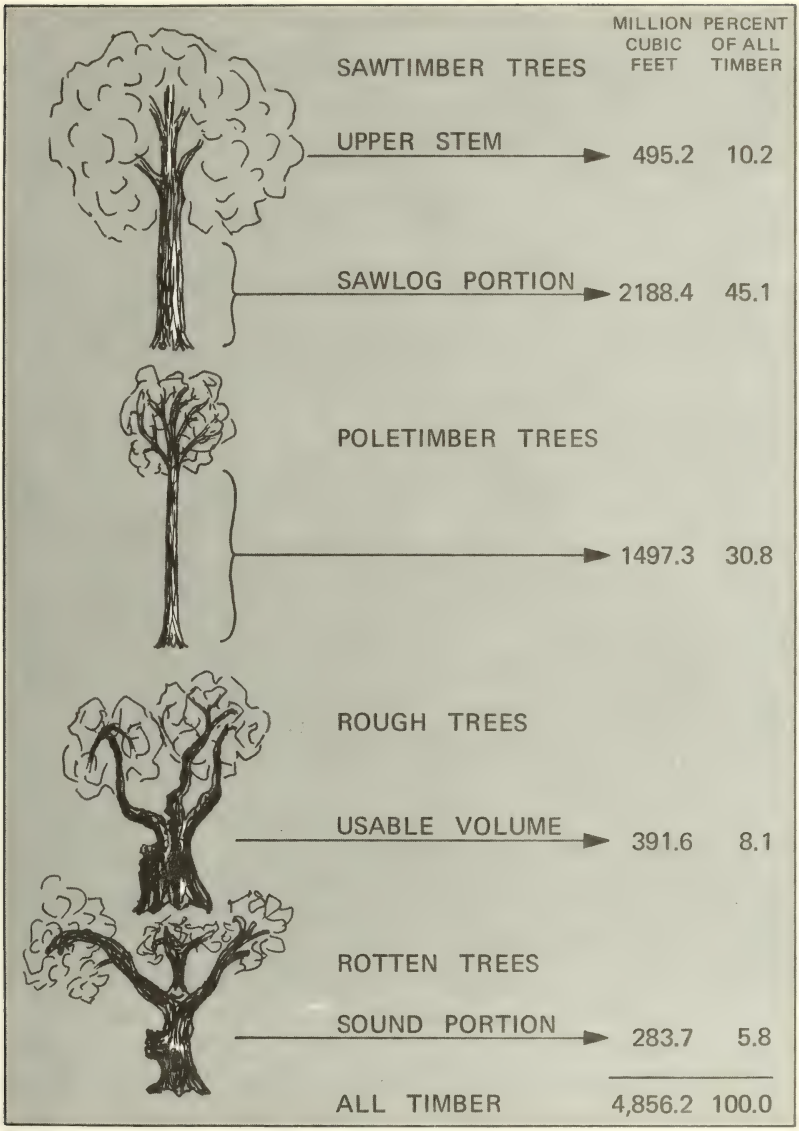


Figure 10.—Distribution of all timber on commercial forest land in Ohio, by kind of material, 1968.

Figure 11.—A once majestic elm succumbs to the Dutch elm disease.

Hardwood species account for slightly more than 97 percent of Ohio's growing stock. The volume is generally well distributed among the various hardwood species common to this region. The oaks are by far the most prevalent species group in Ohio. They account for 1.6 billion cubic feet (39 percent of the hardwood growing stock). Among the oaks, the select white oaks total 593 million cubic feet, select red oaks 313 million, chestnut

oak 252 million, and all other oaks 432 million cubic feet. The second most abundant species group is the hickory group, which accounts for 482 million cubic feet (nearly 12 percent of the hardwood growing stock). Because there is little discrimination among hickory species by industry, no attempt has been made here to show volumes for individual hickory species.

Over the 16-year period the species mix of Ohio's growing stock has been changing. In some cases these changes have been minor and insignificant, but in others they have been major and quite significant. The most notable change was the decline of the elm species (fig. 11). In 1952 the elms accounted for more than 12 percent of the growing stock, but by 1968 they accounted for only 6 percent. Since elm is not a particularly prized timber species, one can only conclude that this decline is almost entirely the result of the Dutch elm disease. The seriousness of this introduced disease needs only to be measured in terms of dead and dying shade trees.

On the plus side, the select white oak species have increased from 11 percent of the inventory to just over 14 percent in 1968. Select red oaks increased from 6 to 7 percent, while the other oak species declined from 18 to 16 percent of the inventory. Hickory increased from 9 to 12 percent. Sugar maple and yellow-poplar increased from 5 to 6 percent, while the ash species and red maple held their own at 6 and 5 percent respectively.

Sawtimber

Sawtimber volume in the Buckeye State totaled 14.6 billion board feet in 1968, up from 11.2 billion in 1952. This 30-percent increase falls short of the 31-percent increase in all growing-stock volume. The Hill Country contains 9.8 billion board feet (67 percent of the State total). This is an increase of 2.7 billion board feet (38 percent) from the 1952 total of 7.1 billion board feet. The Glaciated Region, which now contains 33 percent of the State's sawtimber—4.8 billion board feet—contained 4.0 billion board feet in 1952. Thus the volume of sawtimber in this region rose about 18 percent during the 16-year interval between forest surveys.

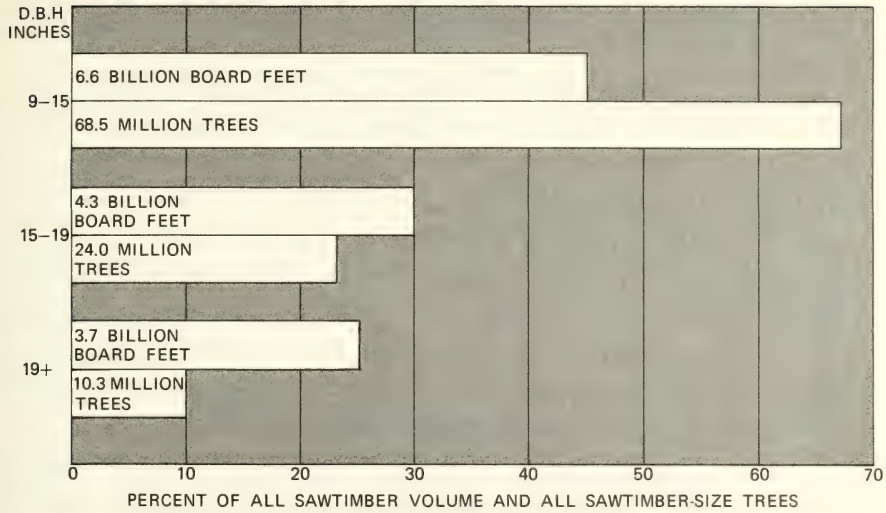
Although the total volume of sawtimber increased, the average diameter of sawtimber trees in Ohio has declined during the 16 years between forest surveys. In 1952, 42 percent of the State's sawtimber volume was in trees 10 to 14 inches in diameter at breast height (d.b.h.). By 1968 this percentage had increased to 44 percent. The volume in 16-to-18-inch trees rose from 27 percent in 1952 to 30 percent in 1968. Thus, even though the volume in sawtimber trees larger than 18 inches increased between surveys, as a percentage of the total sawtimber inventory it fell from 31 percent of the 1952 inventory to 25 percent of the 1968 inventory.

A high percentage of total sawtimber volume in large diameter trees is important for two primary reasons—lumber quality and total lumber volume yield. Usually the larger the tree, the greater the likelihood that the tree will yield high-quality lumber. The sawlog-grading rules used in this survey provide a good illustration of the importance of tree size in relation to lumber quality. These grades use external characteristics of logs as indicators of lumber quality. The log-grade rules for hardwood logs for all practical purposes exclude 12-to-14-inch trees from producing a grade 1 sawlog because a grade 1 log must have a minimum diameter of 13 inches inside bark at the small end. It is highly unlikely that a 14-inch d.b.h. tree could have such a log. Thus 67 percent of Ohio's sawtimber trees almost automatically cannot contain a grade 1 sawlog because of size alone (fig. 12).

It goes without saying that a large tree yields more lumber. But how much more? The International ¼-inch log rule table shows that a 12-inch log 16 feet long can be expected to yield 100 board feet of lumber, but a 24-inch 16-foot log (twice the diameter) will yield 420 board feet (4.2 times as much lumber).

Figure 12 further illustrates the relationship between sawtimber volume and the number of sawtimber-size trees by diameter size classes. Note that only 10 percent of the sawtimber size-trees in Ohio contain 25 percent of the State's sawtimber volume. And, as indicated, much of this 25 percent—3.7 billion board feet—is probably of higher than average quality.

Figure 12.—Large sawtimber trees produce far more lumber than smaller trees.



One-Third of Ohio's Sawtimber is in Upper Log Grades

About one-third of the State's hardwood sawtimber volume is in grade 1 and 2 sawlogs. The distribution of volume by hardwood sawlog grades in 1968 was as follows:

Grade	*Volume (million board feet)*	*Percent (of total volume)*
1	1,772.4	12.5
2	2,973.3	20.9
3	6,818.9	48.0
4	2,637.5	18.6

None of the important commercial species in Ohio has as much as 50 percent of its volume in the top two log grades. The select red oak species, the fourth most abundant species in Ohio (588 million board feet) has the highest proportion of its volume in the top two log grades—47 percent. White oak, the most abundant species, has only 36 percent of its volume in the top two log grades. Beech has the lowest proportion in the top two grades: 19 percent. Beech also has the lowest proportion of its volume in grade 1 logs: only 3 percent.

NET ANNUAL GROWTH EXCEEDS TIMBER REMOVALS

The average annual net growth of growing stock, based on the remeasurement of permanent sample plots, was 3.2 percent of the growing-stock inventory. This average net annual growth estimate represents an average growth for the 16-year period from 1951 through 1967. The removal of growing stock during the same period averaged 1.7 percent of the inventory volume.

The situation for sawtimber is much like that for growing stock. The average annual net growth of sawtimber was 2.9 percent of the sawtimber inventory. The removal of sawtimber averaged 50 percent of the average annual growth.

So far, we have talked in terms of net annual growth. Net growth is the residual after mortality and the cull increment have been deducted from gross growth. Gross growth is the growth on the initial growing stock-growth on trees that were measured in both the 1952 and 1968 forest surveys—plus ingrowth—the growth of trees that grew into the growing-stock size class between the two surveys. Gross growth of growing stock minus cull increment and mortality equals net growth of growing stock. These are the components of growth. The components of net annual growth for growing stock and sawtimber can be expressed in three ways:

GROWING-STOCK GROWTH

Components	*Volume (million cubic feet)*	*Percent of gross growth*	*Percent of growing-stock inventory*
Growth on initial volume	75.0	43	1.8
Ingrowth	99.0	57	2.4
Gross growth	174.0	100	4.2
Annual mortality	27.0	16	.6
Cull increment	14.2	8	.3
Average annual growth	132.8	76	3.2

SAWTIMBER GROWTH

Components	*Volume (million board feet)*	*Percent of gross growth*	*Percent of sawtimber inventory*
Growth on initial volume	200.5	35	1.4
Ingrowth	365.2	65	2.5
Gross growth	565.7	100	3.9
Annual mortality	73.0	13	.5
Cull increment	70.7	12	.5
Net annual growth	422.0	75	2.9

It is through manipulation of these components of growth that timber managers seek to increase net growth and improve timber quality.

TIMBER PRODUCTS OUTPUT

The average annual timber removals shown in this report (tables 20 to 23) were based on the remeasurement of permanent sample plots and should not be confused with the timber-products-output estimates (table 28) and the timber-removal estimate (tables 29 to 31), which are based on a 1966 statewide canvass of forest-products producers.

Timber removals, which include timber cut for products as well as timber removed because of land-use changes like highways and urban development, are based on an average over the period between forest surveys. This gives a reliable description of the growth and removal trend and accurately assesses the changes in the timber inventory since 1952. On the other hand, the timber-removal and timber-products-output estimates for a given year are useful in relating timber removal to the output of timber products. In this section of the report the data obtained from the statewide canvass of timber-products producers are utilized and supplemented with information on timber utilization developed in conjunction with the forest survey and with production data for other years (fig. 13).

In 1952 the total production of timber products in Ohio amounted to 64.5 million cubic feet (fig. 14). By 1966 timber-

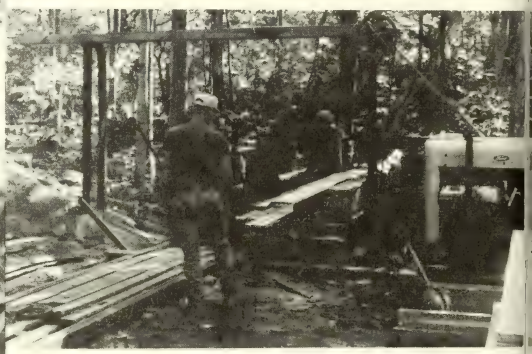
Figure 13.—Some scenes of Ohio's forest-products industry.

Hauling out white oak logs with a logging arch.

Making pallets from lower grade hardwoods.

Black walnut logs await delivery to a veneer mill.

Bowling pins are one of many turned products.



A portable sawmill. Once commonplace, such mills are now seldom seen.

Debarking sawlogs not only provides bark-free slabs that can be chipped for pulpwood, but also increases the life of the headsaw.

products output had risen to 119.4 million cubic feet. The 1967 estimates, however, show a decline to 109.5 million (fig. 14). Indications are that this downturn was a temporary adjustment and that final production estimates for 1968 will be equal to or even higher than the 1966 estimate.

The estimate of timber-products output for a given year may differ substantially from the timber-removal estimate for the same year. The reasons for this lie in the definitions of the two terms. Timber-products output includes only that material, harvested from both growing stock and nongrowing stock, that was converted into forest products such as sawlogs, veneer logs, round pulpwood, pulpwood chips, and fuelwood. Timber removals, on the other hand, include that portion of timber-products output that came from growing-stock sources, plus any growing-stock material that was destroyed or removed in the process of logging or land-clearing. Thus, if a high proportion of the timber-products output came from nongrowing-stock sources while a low proportion of timber removals was for land-clearing, timber-products output could exceed timber removals. This was apparently the case in Ohio in 1966. In that year the timber removed from growing stock totaled 108.8 million cubic feet while the total timber-products output totaled 119.4 million cubic feet.

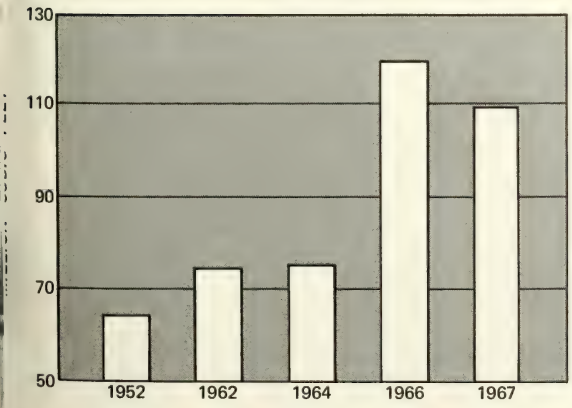


Figure 14.—Timber-products production in Ohio for selected years, 1952-67.

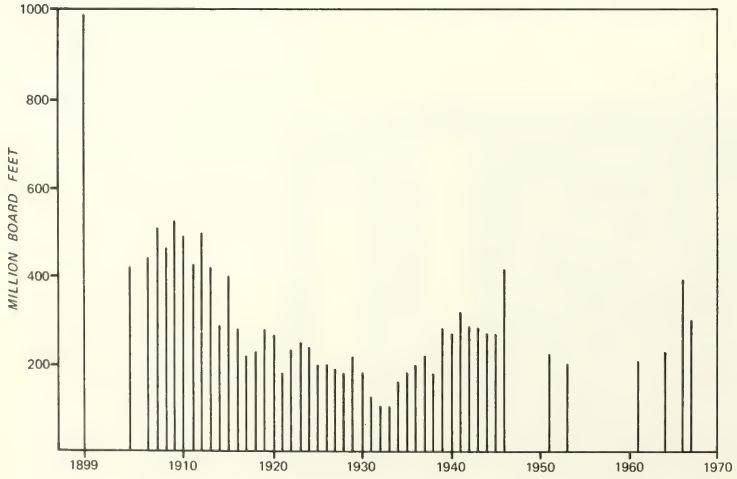
Sawlog Production Up 171 Million From 1951

In 1900 Ohio produced about 1 billion board feet of lumber. By 1952 the production of lumber in Ohio had declined to 219 million board feet. Fourteen years later production had risen to 390 million board feet (fig. 15).

Also, during this period, as lumber production increased, the number of active sawmills in Ohio actually decreased. In 1952 the estimated number of active sawmills in the State was 1,776, while the average production was only 123 thousand board feet per year. In 1966, however, there were only 411 active mills in the State, and the average output was 948 thousand board feet per year. As might be expected, the Hill Country, which is by far the most forested region of the State, has the largest number of active sawmills—218 compared with 193 in the Glaciated Region. The number of mills in the Hill Country equals 53 percent of the mills in the State, but the Hill Country contains 67 percent of the State's sawtimber.

This apparent disparity is accounted for by looking at the average size of mills in the two regions. The 193 mills in the

Figure 15.—The trend of lumber production in Ohio from 1899 through 1967.



Glaciated Region averaged 843 thousand board feet per year while the 218 mills in the Hill Country averaged nearly 1.0 million board feet per year. Thus, the higher output per mill in the Hill Country brings the total production of the region more nearly into balance with its supply of sawtimber.

The species mix of Ohio's sawtimber production reflects the species mix of its sawtimber resource. Thus lumber production in Ohio runs heavily to the oaks. The following table shows the percentage of total production accounted for by various species and species groups in both 1952 and 1966:

Species cut	*1952 (percent)*	*1966 (percent)*
Oaks	45	43
Maples	16	14
Elms	12	4
Beech	8	5
Yellow-poplar	6	11
All other species	13	23

From this tabulation it can be seen that the species cut for sawlogs in Ohio has become somewhat more diversified over the 15-year period between surveys.

Pulpwood Nearly Twelve Times 1951 Output

Pulpwood production in Ohio has shown extraordinary growth from 1951 to 1966. In 1951, with five woodpulp mills, Ohio produced 32 thousand cords of pulpwood. By 1966 the State had six mills and produced 375.5 thousand cords of wood, nearly 12 times the 1951 production (fig. 16).

The species mix of Ohio pulpwood production also reflects the species mix of the timber resource. In 1966, of the 336.7 thousand cords of round pulpwood produced in Ohio, 54 percent was oak and hickory (mostly oak) and only 3 percent was pine (the only softwood species produced). Other hardwood species accounted for 43 percent. In addition to the 336.7 thousand cords of round pulpwood, the equivalent of 38.8 thousand cords in pulpwood chips were produced, mostly from sawmill slabs and edgings. The use of chipped sawmill slabs and edgings for pulp-

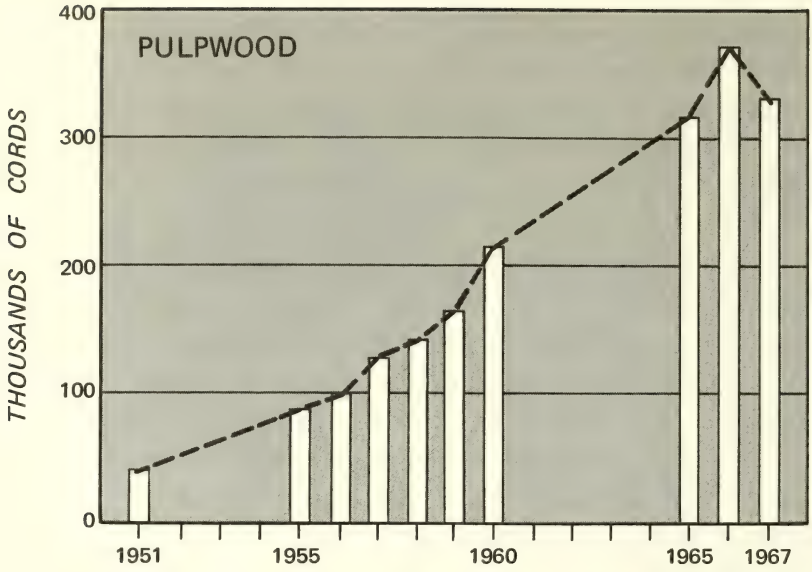


Figure 16.—Since 1951 Ohio's pulpwood industry has shown an outstanding rate of growth.

wood has shown outstanding growth throughout the Nation in recent years and Ohio has been no exception to this trend.

Ohio's six woodpulp mills received 482.8 thousand cords of pulpwood. Thus it was necessary for these mills to import 107,300 cords or 22 percent of their wood from outside Ohio. This additional volume came from West Virginia, Kentucky, Illinois, and Virginia.

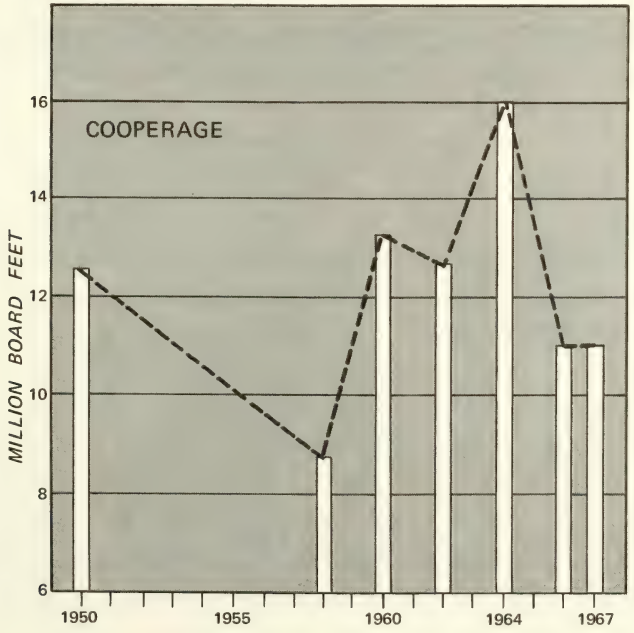
Ohio's woodpulp mills had an estimated daily capacity of 1,285 tons of woodpulp in 1966. Three basic pulping processes are used in Ohio: the sulfate process (575 tons per day), the semi-chemical process (500 tons per day), and the asplund process (roofing pulp) (210 tons per day). The list of products manufactured from these pulps is diversified. They include: book papers, business papers, writing papers, corrugating papers, industrial paper products, and building-material products.

Cooperage Stock at 11 Million

With 12 active cooperage stave mills, Ohio is one of the leading cooperage producing states in the country. In 1966 the State produced 11 million board feet of cooperage stock. Nearly all of this material was white oak for tight cooperage. The wood required by the cooperage industry must be of high quality. Generally, trees 16 inches in diameter at breast height and larger—which will provide straight, knot-free, defect-free bolts—are used to manufacture cooperage staves.

The cooperage industry in Ohio, as in most areas, has been very erratic. Cooperage stock production in Ohio in 1951 amounted to 12.6 million board feet and the State had seven mills. By 1958, production had declined to 8.6 million board feet, but by 1964 it had risen to 16 million board feet. Production turned down again to 11 million board feet in 1966 (fig. 17).

Figure 17.—Cooperage log and bolt production in Ohio has shown an erratic pattern since 1951.



Veneer Log Harvest-6.7 Million

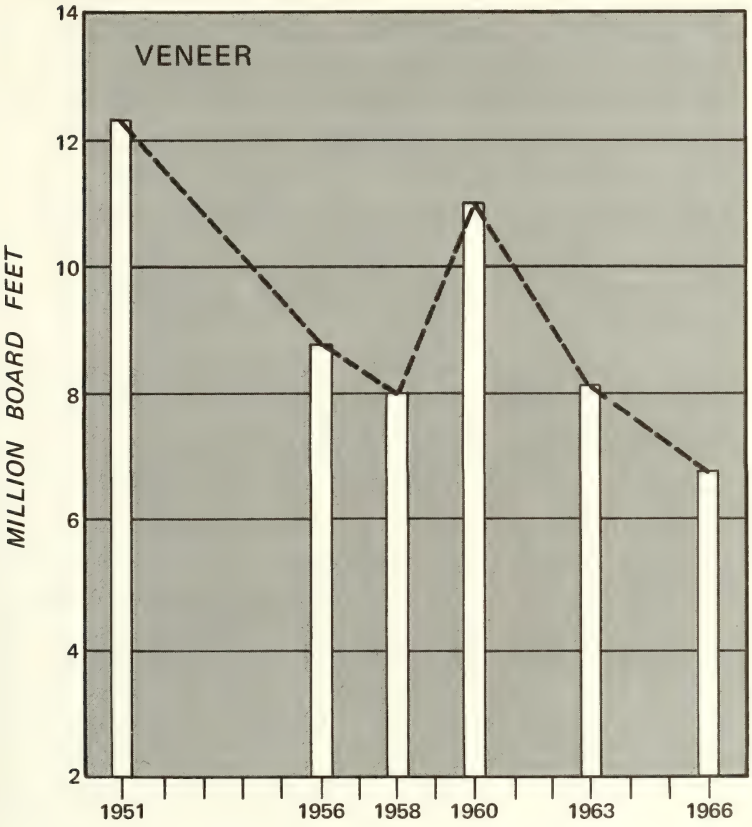
Ohio produces primarily high-quality veneers for plywood panels and furniture. It also produces lower grade veneers for crating and baskets, but this segment of the industry has been declining for several years. In 1951, in the Central States Region, 40 percent of the veneer production was soft hardwood (yellow-poplar, cottonwood, soft maple) for baskets and containers and the remaining 60 percent was other hardwood species for fine veneers. By 1963 basket and container veneers accounted for about 22 percent of the veneer-stock consumption. Veneer production in Ohio has fallen since 1951, with a brief recovery in 1960 (fig. 18).

In 1966 Ohio's veneer mills consumed nearly 4 million board feet, while in that year 6.7 million board feet were harvested from Ohio's forests. The balance of Ohio's veneer-log harvest is shipped to other states and countries for manufacture. The principal receiving state is Indiana, which processes about one-third of Ohio's production. Thirty-eight percent of the veneer-log production in Ohio in 1966 was black walnut. This species is always in demand for veneer, but Ohio's veneer-log production is well distributed among the prevalent species in the State. In 1966 the production of veneer logs in Ohio by species was:

Species	*Thousand board feet*	*Percent of total production*
Black walnut	2,561.6	38
Beech	872.3	13
Other hardwoods	496.0	7
Elm	480.1	7
Hard maple	468.5	7
Yellow-poplar	457.6	7
Gum	314.9	5
White oak	264.0	4
Soft maple	259.4	4
Red oak	231.0	4
Hickory	175.6	3
Basswood	64.7	1
Ash	33.0	(*)
Black cherry	33.0	(*)
All species	6,711.7	100

* Less than 0.5 percent.

Figure 18.—Veneer log production in Ohio has generally declined since 1951.



Other Products

The four main products—sawlogs, pulpwood, cooperage logs and bolts, and veneer logs—accounted for 78 percent of the output of timber products in Ohio in 1966. The remaining 22 percent—26.7 million cubic feet—is made up of a great variety of products. These include fuelwood, mine timbers, fence posts and rails, handle stock, shoe trees, and many other minor products too numerous to mention.

The largest of these other products is fuelwood, which accounted for 174.1 thousand cords or 13.9 million cubic feet in 1966. Of the nearly 14 million cubic feet of fuelwood produced

in Ohio during 1966, nearly 6 million cubic feet was from wood-industry residues like sawmill slabs and edgings. Of the remaining 8 million cubic feet that came from roundwood, only 661 thousand cubic feet were removed from growing stock. Of the remaining 7 million cubic feet, 342 thousand cubic feet came from rough or rotten trees, 2.3 million feet came from dead trees, and nearly 5 million feet came from other sources such as non-commercial forest land, fence rows, shade trees, tree tops and limbs, and from trees less than 5 inches in diameter. Thus, fuelwood constitutes a very minor drain on the growing stock resource.

The second most common of the other products is mine timbers, which in 1966 totaled 1 million cubic feet. Mine timbers are used as props and other timbers primarily to shore up underground mines. They are usually cut from lower quality trees, and all of this material is roundwood. About 80 percent of the mine timber production came from growing stock sources.

The remaining 11.8 million cubic feet of products produced in Ohio in 1966 consisted of poles, posts, and miscellaneous other products. Poles accounted for about 12 thousand cubic feet. Posts—both fence posts and highway guard posts—totaled 866 thousand cubic feet. The remaining volume—10.9 million cubic feet—was distributed among a vast array of minor products including charcoal, handle stock, fence rails, railroad ties, excelsior bolts, turnery bolts, chemical wood, and shoe trees.

TIMBER SUPPLY OUTLOOK

Projecting future events is at best a difficult and risky business. Projecting the future supply of timber in any area is no exception to this rule. Many unpredictable events such as war, depression, and sudden technological advances can drastically alter any projection. Because of this, all long-range projections must be considered in light of the assumptions under which they are made.

In attempting to project the future timber supply in Ohio, we have settled on two sets of projections, each founded on different basic assumptions. However, underlying both of these projections is the assumption that the future commercial forest land area of Ohio will not increase or decrease appreciably. The reasoning behind this is that future demand for agricultural and urban land, which will be needed to feed and house a growing population, will tend to slow any trend toward an increase of forest land and in fact may reverse the trend by the end of the 30-year projection period. It is expected, however, that the Hill Country will become even more heavily forested in the future while the Glaciated Region becomes less forested. But the combination of an increase in forest land in the Hill Country and a decrease in the Glaciated Region is expected to add up to little or no net change for the State as a whole.

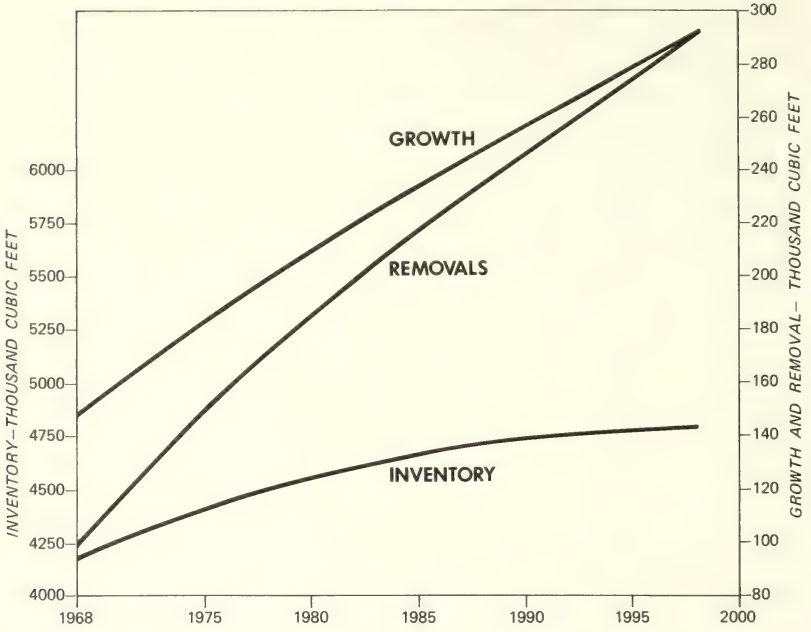
First Projection: Growth Equals Removals in 1998

The first projection proceeds from the basic assumption that the growth and removal of timber in Ohio will come into balance in 30 years. Growth now totals some 149 million cubic feet, while removals total 109 million. They will come into balance at 292 million cubic feet (fig. 19). The total inventory, under this assumption, is expected to rise from 4,181 million cubic feet in 1968 to 4,786 million cubic feet in 1998.

Second Projection: Removals Follow 1951-67 Trend

The second projection proceeds from the assumption that timber removal in Ohio will continue along the average trend from 1951 to 1967 during the next 20 years with a slight upswing in the trend during the remaining 10 years. Under this assumption, growth and removal can be expected to rise from their present levels to 359 million cubic feet of growth and 202 million cubic feet of timber removal. The inventory can be expected to rise from 4,181 to 6,793 million cubic feet (fig. 20).

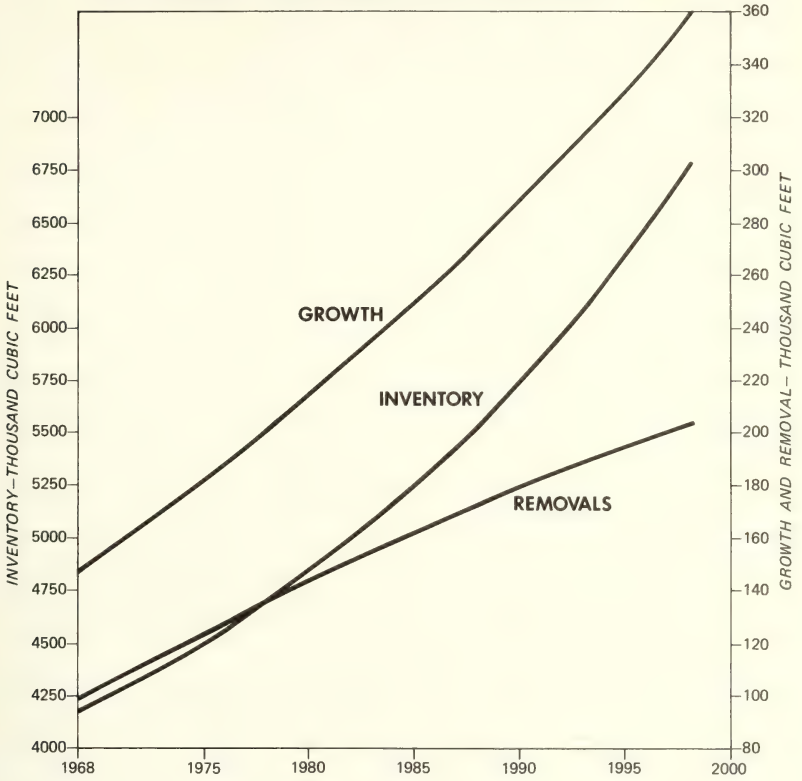
Figure 19.—All growing stock projected growth, removals, and inventory—TRAS projection—1968 to 1998.



Which of the two projections given here will prevail? Only time will tell. Both projections are well within the realm of possibility. The real trend may be midway between these two projections.

Neither of the preceding projections indicate a critical shortage of growing stock in the future. However, the possibility of shortages of sawtimber seem more likely. This can be seen in the first projection (table 33). While the 1998 growth and removal of all growing stock are in balance, the removal of sawtimber is projected to exceed growth by some 241 million board feet. In fact, a deficit of growth for sawtimber first appears in 1978. Thus users of sawtimber-size material can expect shortages of certain species, log grades, and log sizes to continue and possibly worsen in Ohio. These shortages could be eased and corrected if steps are taken to correct the imbalance of stand-size classes discussed in the timber-management section of this report.

Figure 20.—All growing stock projected growth, removals, and inventory—trend projection—1968 to 1998.



MANAGEMENT OPPORTUNITIES

In viewing the forest resources of Ohio, as the forest survey reveals them, we are concerned about the future management of these resources. So we add this section about management opportunities. This certainly is not intended to be a comprehensive treatise about forest management of these resources. Rather, we want to point out problems that need further attention.

It should be further borne in mind that this section is concerned with the maximum production of timber in the shortest period of time possible. A complete forest-management program over a

large area must be broad enough to include the forests as a supplier of recreation, wildlife, water, and scenery. In a highly urbanized state such as Ohio, these other uses of the forest often may be very significant.

Survey Results Show a Major Problem

The results of the forest survey point directly to one major problem facing timber-management efforts in Ohio; a large proportion of the commercial forest land area (56 percent) is in sapling-and-seedling stands, and many of these stands have substantial volume in scattered overstory trees. Timber managers seek to achieve about one-third of the area in each stand-size class—sawtimber, poletimber, and sapling-and-seedling.

This disproportionate area in sapling-and-seedling stands has a profound effect on timber growth in Ohio. Per-acre growth in Ohio averages only 21 cubic feet per year, though one should expect it to range between 30 and 40 cubic feet if the stand-size classes were more evenly distributed.

Furthermore, the averge volume of the sapling-and-seedling stands in Ohio is 312 cubic feet per acre. This is substantially more than in neighboring states, such as Pennsylvania, where they average only 153 cubic feet. This indicates that in Ohio there are many sapling-and-seedling stands that are being held back by an overstory composed of scattered larger and often poorer trees.

In an attempt to analyze the condition and possible needs of these sapling-and-seedling stands, we examined a sample of the field tally sheets for those plots that were classed as sapling-and-seedling stands or as nonstocked areas. We attempted to determine what portion of the sapling-and-seedling stands and the nonstocked areas had sufficient volume in the overstory *to*: (1) sustain a harvest cutting for pulpwood or other small log products; (2) sustain a harvest cutting for sawlogs or veneer logs; or (3) make it economically justifiable to girdle and poison the overstory trees.

We further classified the understory stands as: (1) those needing treatment such as thinning, weeding, or planting; and (2)

those stands that required no treatment. Also, we attempted to estimate the portion of the stands that, because of species composition, stocking or other indications, appear to offer so little promise that no treatment could be economically justified. Though our sample cannot substitute for a thorough stand-by-stand examination, it does give an indication of the extent and magnitude of the treatments needed. The following tabulation summarizes the results of this examination.

Stand	*State*		*Hill Country*		*Glaciated Region*	
	1,000 acres	*Pct.*	*1,000 acres*	*Pct.*	*1,000 acres*	*Pct.*
Capable of sustaining pulpwood cut[1]	479.8	13	358.9	14	45.1	4
Capable of sustaining a sawlog cut[2]	258.4	7	205.9	8	—	—
Overstory needs to be girdled and poisoned[3]	1,254.9	34	922.9	36	304.4	27
Cultural treatment needed in understory	1,144.2	31	717.8	28	405.8	36
No cultural treatment needed in understory	1,476.4	40	999.8	39	360.7	32
Uneconomic to treat in any way	1,144.2	31	743.5	29	360.7	32

Data are not additive because any individual stand may be in one or more categories.
[1] 480 cubic feet (6 cords) of growing stock per acre or more in the overstory.
[2] 2,500 board feet or more per acre or 1,000 board feet or more in black walnut or black cherry.
[3] 250 cubic feet in gross volume in the overstory; and diameter of the overstory trees is 10 inches d.b.h. or larger, with an acceptable understory.

The results of this examination clearly indicate that a large-scale timber-stand-improvement program is needed if these stands are to contribute fully to Ohio's timber production. Furthermore, it shows that 3.5 billion cubic feet or more of usable volume exists in these overstories. Thus it may be possible to both release many overtopped young stands and to supply a substantial portion of Ohio's timber demand at the same time.

Two Timber Types Produce Most of State's Timber Products

Ohio contains two major forest types: the oak-hickory type (often called upland hardwoods), which covers 2,953,800 acres; and the maple-beech-birch type (often called the northern hard-

woods), which covers 1,151,600 acres. Together these two forest types account for 65 percent of Ohio's commercial forest land. These are the types that produce the lion's share of Ohio's timber products. Since the upland hardwoods and the northern hardwoods are two very different timber types, the management of each type is also very different. The suggested course of management for each type is discussed separately.

Management of the Upland Hardwoods

In Ohio the oak types occur on generally poorer sites and produce slightly less volume per acre than the northern hardwoods. Commercially, the oaks are the more important of the two types because they cover three times as much total area as the northern hardwoods and because they generally occur in larger tracts, especially in the hilly, unglaciated portion of the State where soil and topography are poorly suited to agriculture.

Seldom are the funds or labor available to apply intensive management to all stands in an area. For this reason timber production should be concentrated on those sites that will yield the highest return on invested funds and labor.

Considerable research has been undertaken to determine the most suitable management system for upland hardwoods. The results of this research show that the most successful system of management in the oak types is one that includes frequent thinnings with regeneration of stands by clearcutting at the end of the rotation (fig. 21).

Early and frequent thinnings in upland hardwoods can shorten sawlog rotations as much as 40 percent. Thus stands that under little or no management would require 90 to 100 years to produce mature sawlog-size trees could, under constant management (which would include frequent thinnings) produce sawlog-size trees in 55 to 60 years. Several guidelines can be listed for managing the upland hardwoods for timber production:

1. Decide on the area that will be managed as a unit to the end of the rotation.

Figure 21.—A recently clearcut upland hardwood stand. While temporarily unattractive, such areas quickly become young stands and also provide excellent habitat for many wildlife species.

2. Depending on site quality and products desired, determine the average size of trees desired at the end of the rotation.
3. Select the potential crop trees and keep them free to grow throughout the rotation by means of frequent thinnings, 8 to 15 years apart, up to a stand age of 50 to 60 years.
4. Adjust the intensity of cultural work to the quality of the site; concentrate the most work on the better sites.
5. Do not thin below minimum full utilization of the site—usually 55 to 60 percent of normal stocking.
6. At the end of the rotation, regenerate the stand by clearcutting.

Because of the already short rotation, it is not possible to shorten pulpwood rotations by frequent thinnings. However, frequent thinning will greatly increase the total yield from pulpwood stands over the full rotation. At this time, however, high carrying costs of land, and the high degree of mechanization in pulpwood harvesting, may often make it impossible to conduct profitable thinnings in stands that are being managed exclusively for pulpwood. Ironically, the development of profitable thinning techniques in pulpwood production may be spurred by even higher carrying costs for land and the development of less expensive and more mobile equipment. Thus it may become necessary to cover part of these high carrying costs of land by increasing the total yield of pulpwood over the rotation, which can be accomplished only through the use of regular thinning.

Clearcutting appears to be the best method for regenerating stands in the upland hardwoods for several important reasons. First, clearcutting favors the establishment of the intolerant, and generally most valuable species. Second, the upland hardwood species grow most rapidly in full sunlight. And finally, most of the present sawtimber stands in the Hill Country resulted from heavy cutting 80 to 100 years ago.

Because this past cutting all took place over a relatively short period of time, many of today's sawtimber stands are at about the same stage of development. Thus the region now has a seriously unbalanced distribution of age classes. Carefully arranged, clearcutting, over a period of time, can serve to correct this imbalance and bring about a better distribution of stand-age classes and more uniform timber yields.

If the present stands are harvested only when they are mature, the present unbalanced pattern of stand-age classes in the region will be perpetuated. This could have a very serious effect on the region's economy because stable, modern, large-scale wood-using industries require a steady flow of timber. Smaller, less stable firms would move into the region to exploit the abundance of timber. But they would move out of the region or go out of business once this abundant timber had been consumed. Such a cut-out and get-out pattern would tend to perpetuate a cyclic

regional economy and would discourage those firms that could provide steady and large-scale employment from locating in the region.

Clearcutting means removing not only all merchantable stems, but also removing or poisoning all smaller stems down to about the 2-inch diameter class. It is also important in clearcutting to remove all rough or rotten trees and all trees that appear to be potential rough or rotten trees.

Seed trees are not necessary for reproduction of upland hardwood stands. Research has shown that yellow-poplar seed remains viable for at least 4 years, ash seed remains viable at least 2 years, and there is circumstantial evidence that cherry seed remains viable for several years too. Oaks, in the new stand, regenerate from previously established seedling sprouts and stump sprouts. Bey showed that 27 years after clearcutting in a fully stocked central hardwood stand, most of the oak reproduction had root systems that were 3 to 37 years older than the stems.

Management of the Northern Hardwoods

The northern hardwoods are the predominant species in most of the Glaciated Region of Ohio. Much of the forest land in this region (52 percent) is owned by farmers; and much of it is in relatively small tracts. The most realistic management objective for timber production in this region and type would appear to be to concentrate on producing high-value species and high-quality logs. Such high-value species include sugar maple, ash, and white oak, and in some areas black cherry and black walnut.

The northern hardwoods allow a wider range of silvicultural options than do the oak types. These options range from single-tree selection through group selection to a full-scale even-aged system such as previously described for the upland oaks. Because there are few extensive tracts of northern hardwood in Ohio, the single-tree selection and group-selection systems will probably be best suited to the objectives of most of the region's forest landowners.

The use of single-tree selection cutting will increase the proportion of sugar maple in a stand. The single-tree selection system also perpetuates a continuous forest canopy, provides maximum site protection, and, when it is properly applied, produces large high-value products in individual trees.

The use of the group-selection system will increase the proportion of the less tolerant species in the stand. In fact, deliberate openings must be created to reproduce the highly intolerant and valuable species such as black cherry and black walnut.

The use of small clearcuttings has been used sucessfully to regenerate northern hardwoods. In those northern hardwood stands in Ohio that contain large numbers of yellow-poplar, red oak, black cherry, or black walnut, or where management is aimed toward production of these species, the use of a clearcutting system should be given consideration.

Forest Land Ownership

Ninety-two percent of Ohio's commercial forest land is owned by farmers or by a variety of private owners—school teachers, businessmen, and the like. These people generally own relatively small holdings for almost as many reasons as there are owners. They may own forest land for hunting, land speculation, aesthetics, or simply because "it came with the place." Whatever an individual's reasons may be, research indicates that practicing forestry for timber production is not likely to be his reason, particularly if the owner has a small holding.

The theoretical potential of private forest land for timber production nearly staggers the imagination. Therefore one of the major problems faced by those public and private agencies concerned with forest management is: "How can we interest the private forest landowner in practicing forestry?" Ways should be investigated to encourage the practice of forestry among private woodland owners. When this can be accomplished, Ohio will be a big step closer to realizing the full potential of its forest land.

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■

APPENDIX

DEFINITIONS OF TERMS

Land Area Classes

Land area.—(a) *Bureau of the Census.* The area of dry land and also land that is temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals that are less than 1/8 statute mile in width; and lakes, reservoirs, and ponds that are less than 40 acres in area. (b) *Forest Survey.* The same as the Bureau of the Census, except that the minimum width of streams, etc., is 120 feet, and the minimum size of lakes, etc., is 1 acre.

Forest land.—Land that is at least 10 percent stocked (contains at least 7.5 square feet of basal area) by forest trees of any size, or that formerly had such tree cover, and is not currently developed for nonforest use. (Forest trees are woody plants that have a well-developed stem and usually are more than 12 feet in height at maturity.)

Commercial forest land.—Forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization. (*Industrial wood:* all roundwood products, except fuelwood.)

Noncommercial forest land.—Forest land that is incapable of yielding timber crops because of adverse site conditions (unproductive forest land), and productive forest land that is withdrawn from commercial timber use through statute or administrative regulations (productive-reserved forest land).

Productive-Reserved Forest Land.—Forest land that is sufficiently productive to qualify as commercial forest land, but is withdrawn from timber utilization through statute or administrative designation.

Unproductive Forest Land.—Forest land that is incapable of producing 20 cubic feet per acre of industrial wood under natural conditions, because of adverse site conditions.

Nonforest Land.—Land that has never supported forests; and land formerly forested but now in nonforest use such as crops, pasture, urban areas, and the like.

Ownership Classes

National Forest.—Federal lands that have been legally designated as National Forests or purchase units, and other lands that are under the administration of the Forest Service.

Other Federal.—Federal lands other than national forests that are administered by other Federal agencies.

State.—Lands that are owned by the State of Ohio or leased to the State for 50 years or more.

County and municipal.—Lands that are owned by counties and local public agencies or municipalities or leased to them for 50 years or more.

Forest industry.—Lands that are owned by companies or individuals operating wood-using plants.

Farmer-owned.—Lands that are owned by farm operators. Excludes land leased by farm operators from nonfarm owners.

Miscellaneous private. — Privately owned lands other than forest-industry and farmer-owned lands.

Stand-Size Classes

Stand.—A growth of trees on a minimum of 1 acre of forest land that is at least 16.7 percent stocked by forest trees of any size.

Sawtimber stands.—Stands that are at least 16.7 percent stocked with growing-stock trees (see definitions under *Tree Classes*), with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands that are at least 16.7 percent stocked with growing-stock trees, of which half or more of this stocking is in poletimber and/or sawtimber trees and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands.—Stands that are at least 16.7 percent stocked with growing-stock trees, of which more than half of the stocking is saplings and/or seedlings.

Nonstocked areas.—Commercial forest land that is less than 16.7 percent stocked with growing-stock trees.

Stocking Classes

Stocking. — The degree of occupancy of land by trees, measured in terms of basal area and/or number of trees in a stand compared to the basal area and/or number of trees required to utilize fully the growth potential of the land. The actual stocking at a point was evaluated against a standard of 75 square feet of basal area per acre. The stocking percentage for a sample plot is derived from the stocking for each of 10 points. Three categories of stocking are used:

All live trees.—These are used in the classification of forest land and forest types.

Growing-stock trees.—These are used in the classification of stand-size classes.

Desirable trees.—These are used in the classification of area-condition classes.

The degree of plot stocking is viewed as a range of values rather than single points. A fully stocked stand lies within the range of 100 to 133 percent of the basal-area standard. An overstocked stand contains more than 133 percent. The range for medium stocking is 60 to 100 percent and for poor stocking is 16.7 to 60 percent of the basal-area standard. Forest land with less than 16.7 percent of the basal-area standard is classed as nonstocked.

Tree Classes

Growing-stock trees.—Live trees of commercial species that are classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough or rotten trees. (See definitions under *Class of Timber.*)

Acceptable trees.—Growing-stock trees of commercial species that meet specified standards of size and quality, but do not qualify as desirable trees.

Desirable trees.—Growing-stock trees of commercial species: (a) that have no serious defects in quality that limits present or prospective use for timber products, (b) that are of relatively high vigor, and (c) that contain no pathogens that may result in death or serious deterioration before rotation age.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot sawlog or two noncontiguous sawlogs, each 8 feet or longer, now or prospectively, and do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees.—(1) The same as above, except that rough trees do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (2) all live trees that are of noncommercial species.

Site Quality Classes

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood. Classifications are based upon the mean annual growth of growing stock attainable in fully stocked stands at culmination of mean annual growth.

Forest Types

The forest-type classification of each sample plot is based upon the species that make up a plurality of live tree stocking. The many local forest types were combined into the following major forest types.

White pine-red pine-hemlock.—Forests in which eastern white pine, red pine, or hemlock, singly or in combination, make up a plurality of the stocking. (Common associates include aspen, birch, and maple.)

Virginia-pitch pine.—Forests in which Virginia pine, pitch pine, or other southern yellow pines, singly or in combination, make up a plurality of the stocking. (Common associates include oak, hickory, and gum.)

Oak-pine.—Forests in which hardwoods (usually upland oaks) make up a plurality of the stocking, but in which pines comprise 25 to 50 percent of the stocking. (Common associates include gum, hickory, and yellow-poplar).

Oak-hickory.—Forests in which upland oaks or hickory, singly or in combination, make up a plurality of the stocking, except where pines comprise 25 to 50 percent, in which case the stand would be classified oak-pine. (Common associates include yellow-poplar, elm, maple, and black walnut.)

Oak-gum.—Bottomland forests in which blackgum, sweetgum, or oaks, singly or in combination, make up a plurality of the stocking, except where pines comprise 25 to 50 percent, in which case the stands would be classified oak-pine. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-red maple.—Forests in which elm, ash, or red maple singly or in combination, make up a plurality of the stocking. (Common associates include willow, sycamore, beech, and cottonwood.)

Maple-beech-birch.—Forests in which sugar maple, beech or yellow birch, singly or in combination, make up a plurality of the stocking. (Common associates include hemlock, elm, basswood, and white pine.)

Aspen-birch.—Forests in which aspen, paper birch, or gray birch, singly or in combination, make up a plurality of the stocking. (Common associate is maple.)

Class of Timber

Softwoods. — Coniferous trees that are usually evergreen, having needles or scalelike leaves.

Hardwoods.—Dicotyledonous trees that are usually broad-leaved and deciduous.

Sawtimber trees.—Live trees of commercial species: (a) that are of the following minimum diameters at breast height—softwoods 9.0 inches and hardwoods 11.0 inches, and (b) that contain at least one 12-foot merchantable sawlog and meet regional specifications for freedom from defect.

Poletimber trees.—Live trees of commercial species that meet regional specifications of soundness and form, and are at least 5.0 inches in d.b.h., but are smaller than sawtimber size.

Saplings.—Live trees of commercial species that are 1.0 to 5.0 inches in diameter at breast height and of good form and vigor.

Seedlings.—Live trees of commercial species that are less than 1.0 inch in diameter at breast height that are expected to survive.

Rough and rotten trees.—See definitions under *Tree Classes.*

Select Species

Select Oaks.—The following oak species are considered select because they are the preferred oak species for lumber.

Select white oaks:

White oaks—*Quercus alba*
Swamp chestnut oak—*Q. michauxii*
Chinkapin oak.—*Q. muehlenbergii*
Durand oak—*Q. durandii*
Swamp white oak—*Q. bicolor*
Bur oak.—*Q. macrocarpa*

Select red oaks:

Northern red oak—*Q. rubra*
Cherrybark oak—*Q. falcata var. pagodaefolia*
Shumard oak.—*Q. shumardii*

Timber Volume

Growing-stock volume.—Net volume, in cubic feet, of live growing-stock trees that are 5.0 inches d.b.h. and over from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for rot.

Standard cord.—A unit of measure for stacked bolts of wood, encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying an average factor of 80 cubic feet of wood (inside bark) per rough cord.

Sawtimber volume.—Net volume in board feet, International ¼-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Sawlog.—A log that meets minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods. (See specifications under *Log Grade Classification.*)

Sawlog portion.—That part of the bole of a sawtimber tree between the stump and the sawlog top (merchantable height).

Sawlog top.—The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Log Grade

Log grades are a classification of logs based on external characteristics as indicators of quality or value. The log-grade standards and grading systems used in this forest survey of Ohio are outlined below.

HARDWOOD FACTORY LUMBER LOG GRADES

(From USDA Forest Products Laboratory Report D 1737)

GRADE FACTORS*		SPECIFICATIONS							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts & uppers		Butts & uppers				Butts & uppers
Minimum diameter (inches)		13-15[1]	16-19	20+	11[2]		12+		8+
Minimum length (feet)		10+	10+	10+	10+	8-9	10-11	12+	8+
Clear cuttings** on each of the 3 best faces	Min. length (ft.)	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	—
	Min. yield in face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Max. sweep and crook allowance (percent of gross volume) See page 69 for scale deductions		15			30				50
Max. cull and sweep allowance) (percent of gross volume		40[3]			50[4]				50

*End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in Forest Products Lab. Rpt. No. D 1737.

**A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.

[1] Ash and basswood butts can be 12 inches if otherwise meeting requirements for small No. 1's.

[2] 10-inch logs of all species can be No. 2 if otherwise meeting requirements for small No. 1's.

[3] Otherwise No. 1 logs with 41-50 percent cull can be No. 2.

[4] Otherwise No. 2 logs with 51-60 percent cull can be No. 3.

Source: A GUIDE TO HARDWOOD LOG GRADING, p. 11, NE. Forest Exp. Sta., Upper Darby, Pa. 1963.

HARDWOOD CONSTRUCTION LOG SPECIFICATIONS

(Grade 4)

GRADE FACTORS		SPECIFICATIONS
Position in tree		Butts and uppers
Scaling diameter (inches)		8+
Length, without trim (feet)		8+
Clear cuttings		No requirements: not graded on cutting basis.
Max. sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound surface defects permitted**	Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.	

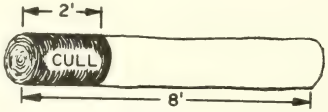
*Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

**Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

Source: A Guide to Hardwood Log Grading, p. 28, NE. Forest Exp. Sta., Upper Darby, Pa. 1963.

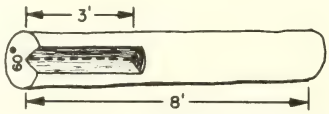
METHODS OF DETERMINING SCALING DEDUCTION

(Examples based on an 8-foot log with 20-inch scaling diameter)



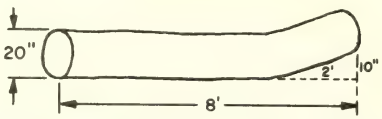
If section of bole is affected, deduct percent of log length affected.

Example: $\frac{2}{8} = 25$ percent cull



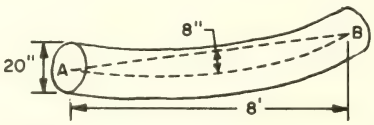
If sector is affected, multiply percent of circle times percent of length.

Example: $\frac{60°}{360°} \times \frac{3}{8} = 6$ percent cull



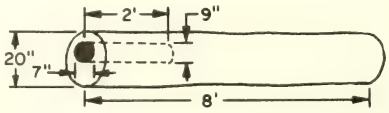
For a crook, multiply proportion of diameter displaced times proportion of log length affected by crook.*

Example: $\frac{10}{20} \times \frac{2}{8} = 12$ percent board-foot cull



For a sweep, determine sweep departure and subtract 1 inch for 8-foot logs or 2 inches for 16-foot logs. Divide by log diameter.

Example: $\frac{8 - 1}{20} = 35$ percent board-foot cull**



For interior cull, square out interior cull as a percent of total volume of the section. For board-foot cull, add 1 inch to width and to thickness; for cubic-foot cull, use actual dimensions of rot. For board-foot cull divide width and thickness by the scaling diameter (average d.i.b., small end) minus 1; for cubic-foot cull, divide by scaling diameter. Multiply fractions by percent of log affected.

Example: $\frac{8 \times 10}{20\text{-}1} \times \frac{2}{8} = 6$ percent cubic-foot cull.

* No reduction of cubic-foot volume will be made.

** If a straight line between A and B falls outside the bark, the affected section is over 50 percent cull in board feet.

WHITE PINE LOG GRADES

Unpublished Trial Specifications, 1963

Log grade	Minimum size		Defect allowance		Maximum weevil injury	Allowable knot size (inches) on 3 best faces or minimum clearness on 4 faces
	Diameter	Length[1]	Sweep or crook	Total cull including sweep		
	Inches	*Feet*	*Percent*	*Percent*	*Number*	*Inches*
No. 1	12 & 13	8-16	20	50	0	4 faces free of knots ½" or larger full length of log.
	14+	10-16	20	50	0	2 faces free of knots ½" or larger full length of log, or 4 faces free of knots ½" or larger 50 percent length of log (6' minimum length), or[2]
No. 2	6+	8-16	30	50	0	Sound red knots $\overline{=}<$[3] D6/ and no larger than 3" Black knots: Butt logs $\overline{=}<$ D/12 and no larger than 1½". Upper logs $\overline{=}<$ D/10 and no larger than 1½". or 4 faces free of knots ½" or larger 50 percent length of log.
No. 3	6+	8-16	40	50	8' logs: 1 weevil 10' + logs: 2 weevil	Sound red knots $\overline{=}<$ D/3 and no larger than 5". Black dots $\overline{=}<$ D/6 and no larger than 2½".
No. 4	6+	8-16	50	50	No Limit	No Limit

[1] Plus trim.

[2] If the sum of the diameters of sound red knots plus 2X (sum of the diameters of dead or black knots) in inches is $\overline{=}<$ ½ the diameter of the log (in inches).

[3] $\overline{=}<$ means equal to or less than.

SOUTHERN PINE LOG GRADES

Grade factor	Grade			
	1	2	3	4
Minimum	17″	10″	6″	6″
Maximum K value	1/5D	1/2D	None	None
Minimum specification on bad knots			Any bad knots present are localized in section not exceeding 1/4 circumference and length	No limit

Exceptions

a. Lower one grade any log, not grade 4, having 3 inches or more of sweep if such sweep is 1/3 or more of log diameter.

b. Lower one grade any log, not grade 4, if heart-rot fruiting has occurred or is imminent, as indicated by conk or visible, massed, heart-rot hyphae.

K = Number of overgrown knots plus sum of diameters of sound knots plus twice sum of diameters of unsound knots.

Bad knot: A knot with diameter > D/6, or an unsound knot (advance decay or a hole > 1/4″ and 2″ or more deep).

Source: Forest Service Log Grades for Southern Pine. USDA Forest Serv. Res. Paper SE-11, SE. Forest Exp. Sta. 1964.

Net Annual Growth and Timber Removals

Average net annual growth of growing stock.—The change (resulting from natural causes) in volume of sound wood in sawtimber and poletimber trees during the period between surveys, divided by the length of the period. (Components of net annual growth of growing stock include the increment in net volume of trees present at the beginning of the period and surviving to its end, plus net volume of trees, reaching poletimber size during the period, minus the net volume of trees that died during the period minus the net volume of trees that became rough or rotten trees during the period.)

Ingrowth of growing stock.—The net cubic-foot volume of trees now classed as growing stock that were not tallied as such on the initial survey, divided by the length of the period between surveys.

Average annual mortality of growing stock.—The net cubic-foot volume removed from the growing stock through death from natural causes during the period between surveys, divided by the length of the period.

Average annual growing-stock removals.—The net cubic-foot volume of live growing-stock trees harvested or killed in logging, cultural operations such as timber-stand improvement, land-clearing, or changes in land use during the period between surveys and converted to an annual basis.

Average net annual growth of sawtimber.—The change (resulting from natural causes) in net board-foot volume of sawtimber during the period between surveys, divided by the length of the period. (Components of net annual growth of sawtimber include the increment in net volume of sawtimber trees present at the beginning of the period and surviving to its end, plus the net volume of trees reaching sawtimber size during the period, minus the net volume of sawtimber trees that died during the period, minus the net volume of sawtimber trees that became rough or rotten during the period.)

Ingrowth of sawtimber.—The net board-foot volume of trees now classed as sawtimber that were not tallied as such on the initial survey, divided by the length of the period between surveys.

Average annual mortality of sawtimber.—The net board-foot volume removed from live sawtimber through death from natural causes during the period between surveys, divided by the length of the period.

Average annual sawtimber removals.—The net board-foot volume of live sawtimber trees harvested or killed in logging, cultural operations such as timber-stand improvement, land-clearing, or changes in land use during the period between surveys and converted to an annual basis.

FOREST-SURVEY METHODS

The forest area and timber volume estimates of Ohio were obtained by combining the results of two independent inventories. One was based on the updating of the initial survey (1952). This procedure required the remeasurement of a subsample of the initial inventory ground plots. With the area change and current volume estimates obtained from the remeasured sample plots, regression techniques were used to update all the initial ground and photo plots to obtain an estimate of current timber volume and forest area.

The secondary inventory was also based on a large photo-plot sample with a subsample of ground plots. For the second measurement, the most recent aerial photography coverage of Ohio was used. Photo plots were pinpointed on each photograph to provide a uniformly distributed sample of the area. Each photo plot was examined stereoscopically and was classified as either forest or nonforest land. Those classified as forest plots were further stratified into cubic-foot-volume-per-acre classes. A subsample of these photo plots, which was selected to be proportional to the area in a photo class, was measured on the ground. From this ground measurement, estimates of the mean and variance of each photo class were obtained. These means were expanded by the photo-strata area to yield an independent estimate of forest area and timber volume.

The final estimates of current forest area and timber volume were developed by combining the two independent inventories. The combination process consisted of weighing each estimate by the reciprocal of its variance and then adding them. The associated sampling error for this new estimate was also obtained. These combined totals were partitioned into the various categories of area and volume (volume by species and d.b.h. class) using the data obtained from the new ground-plot sample.

In addition to estimating current timber volume and forest area, the forest survey of Ohio was designed to obtain an estimate of the components of change during the period between the initial and current inventories. The parameters of interest include area change from forest to nonforest and vice versa, timber growth, timber removals, and timber mortality. All this information was obtained from the remeasured plots. The timber-change parameters were obtained by a tree by tree reconciliation of each remeasured plot. Using the reconciliation code for each remeasured tree, estimates of the parameters of change were made by species. The estimates of change were expressed as an annual figure by dividing the total for the period by the number of years between measurements.

Remeasured Phase

The initial forest inventory of Ohio consisted of a large photo-plot sample plus a ground measurement of a subsample of these photo plots. The photo plots were stratified according to land use as forest or nonforest. The forest plots were further classified into stand-size classes. Nearly 2,400 ground plots were measured by field crews during this first inventory. These ground samples were 1/5-acre circular radius plots.

At this second measurement occasion, a sample of 582 of the initial ground plots, selected randomly within each initial plot class, was revisited. These plots were distributed within the geographic units of Ohio as follows:

The Hill Country		*The Glaciated Region*	
South-central Unit	— 117	Northeastern Unit	— 128
Southeastern Unit	— 106	Western Unit	— 122
East-central Unit	— 109		

The plot center was relocated for each remeasured plot. On those plots that were forested, all the trees on the 1/5-acre were tallied. The new tally was reconciled with the initial tally to account for every tree at both occasions.

New Ground Phase

The source of the new independent estimates of volume and forest area was a new photo stratification with a subsample of ground measurements. The photo sample of Ohio consisted of 100,880 photo points on 1964-65 aerial photography. A subset of 3,988 of these photo plots were located on the ground. Land use was verified and tree-measurement data were recorded for the forest plots. Unlike the initial inventory where fixed-radius 1/5-acre plots were tallied, the new ground plots consisted of a cluster of 10 prism points systematically covering approximately 1 acre. At each point, trees were selected for tally, using a prism with a basal-area factor of 37.5. Area attribute data were also tallied at each of the 10 points.

The 3,988 ground plots in Ohio were distributed within geographic strata as follows:

The Hill Country		*The Glaciated Region*	
South-central Unit	— 760	Northeastern Unit	— 540
Southeastern Unit	— 495	Western Unit	— 1,348
East-central Unit	— 767		

County Data

In recent years users of forest-survey data have shown a need for county information. To provide such information, within the framework of the survey design, county tables have been developed based on a survey unit partitioning technique. First the survey unit means and variances for the various photo-plot strata are applied to the photo-plot data for each county within the survey unit. This yields an estimate of total volume or total commercial forest land area for each county. Next, the data from all the new ground plots in the unit are used to partition the county totals into their various components. For example, if a table of cubic-foot volume by softwoods and hardwoods is to be made for a county, the estimate of total cubic-foot volume for that county is partitioned into softwood and hardwood totals according to the proportion of softwoods and hardwoods for all new forest-survey ground plots within the unit.

Wayne National Forest

A separate inventory of the approximately 120,000 acres of forest land comprising the Wayne National Forest was conducted by the inventory staff of the National Forest Administration, Region 9. This inventory was designed to estimate current volume and commercial forest area, using the photo stratification of the most recent aerial photography. The photo stratification of 5,635 points was only on the basis of forest-nonforest area. No attempt was made to estimate forest photo volume classes. A subsample of 78 of the photo plots was located and measured on the ground to estimate volume and area means and variances. These means were expanded by the photo stratification to obtain an estimate of total volume and area. The totals were partitioned, based on the measurement data from the ground sample plots. The regular forest-survey plots were excluded from the national forest land and this separate inventory was added to obtain the State total.

Comparisons Between Inventories

After inventories have been completed for several points in time, it is desirable to evaluate the trends between the several inventories and to make comparisons. A comparison of the 1968 and 1952 forest-survey estimates of volume, growth, removals, and mortality was made of Ohio. A computer program TRAS (Timber Resource Analysis System) was utilized.

Since the survey unit boundaries were different at the first occasion, no direct comparisons can be made between units. The present units will be used for the third inventory so comparisons between units will be possible at that time. The procedure for obtaining county data (See *Forest-Survey Methods*) does not make possible comparisons of inventory trend for a county.

The initial and the second estimates of softwood inventory volume are directly comparable for the State. However, this is not the situation for the hardwood portion of the inventory volume. The reason for this is a significant change in the procedure for classifying a growing-stock tree since the 1952 forest survey.

In the original inventory, any tree with an 8-foot sawlog that met grade requirements, or had the potential for producing such a sawlog, was classed as a growing-stock tree. The current definition of growing stock requires the tree to have now or potentially at least one 12-foot sawlog meeting grade requirements. This change has resulted in many trees, especially hardwoods, being reclassified from growing stock to the rough and/or rotten category.

Consequently, in comparing the 1952 hardwood inventory volumes with the 1968 inventory, the 1952 hardwood data had to be adjusted to reflect this change in standards. It should be noted that the major portion of the hardwood trees that would no longer meet the growing-stock sawlog-length requirement were located in the Glaciated Region. Thus, any comparisons that are made for only the Hill Country can be made directly between the 1952 and the 1968 hardwood inventory estimates.

Reliability of the Estimates

The forest-area and timber-volume data presented in this report are based upon a carefully designed sample of forest conditions throughout Ohio. However, since neither every acre nor every tree in the State was measured, the data presented in this report are estimates. A measure of the reliability of these estimates is given by a sampling error. Each estimate in this report has had an associated sampling error calculated for it. These appear in the data tables.

Briefly, this is how the sampling error indicates the reliability of an estimate. Our estimate of the total growing-stock volume in Ohio, 4,181 million cubic feet, has an associated sampling error of 1.5 percent (62.7 million cubic feet). This means that our best estimate of the total growing-stock volume in Ohio in 1968 is 4,181 million cubic feet. If there are no errors in procedure, the odds are 2 to 1 that, if we repeated the survey in the same way, the resulting estimate of growing-stock volume would be between 4,118 million and 4,244 million cubic feet ($4{,}181 \pm 63$). Similarly, the odds are 19 to 1 that it would be within $\pm$ 125 million cubic feet and 300 to 1 that it would be within 188 million cubic feet.

The computed sampling error is not a complete measure of reliability. There are other sources of error that this term does not include. There could be imperfections in our volume tables and equations and errors in field measurement. Procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in the statistical tables are:

	Sampling error (percent)
Commercial forest area (4.4 million acres)	1.6
Growing-stock volume (4.2 billion cubic feet)	1.5
Sawtimber volume (14.6 billion board feet)	1
Average net annual growth (132.8 million cubic feet)	9
Average annual removals (70.5 million cubic feet)	14

COMMON COMMERCIAL SPECIES OF OHIO[3]

Softwoods

Eastern redcedar	*Juniperus virginiana*
Norway spruce	*Picea abies*
Shortleaf pine	*Pinus echinata*
Red (Norway) pine	*P. resinosa*
Pitch pine	*P. rigida*
Eastern white pine	*P. strobus*
Scotch pine	*P. sylvestris*
Virginia pine	*P. virginiana*
Baldcypress	*Taxodium distichum*
Northern white-cedar	*Thuja occidentalis*
Eastern hemlock	*Tsuga canadensis*

Hardwoods

Boxelder	*Acer negundo*
Black (hard) maple	*A. nigrum*
Red maple	*A. rubrum*
Silver maple	*A. saccharinum*
Sugar (hard) maple	*A. saccharum*
Ohio buckeye	*Aesculus glabra*
Yellow buckeye	*A. octandra*
Yellow birch	*Betula alleghenienses*
Sweet (black) birch	*B. lenta*
Red (river) birch	*B. nigra*
Paper (white) birch	*B. papyrifera*
American hornbeam (Blue beech)	*Carpinus caroliniana*
Hickory species	*Carya spp.*

[3] Little, Elbert L., Jr. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U. S. Dep. Agr., Agr. Handbook 41, 472 pp. 1953.

Southern catalpa	*Catalpa bignonioides*
Northern catalpa	*C. speciosa*
Hackberry species	*Celtis spp.*
Persimmon	*Diospyros virginiana*
American beech	*Fagus grandifolia*
White ash	*Fraxinus americana*
Black ash	*F. nigra*
Green ash	*F. pennsylvanica*
Blue ash	*F. quadrangulata*
Honey locust	*Gleditsia triacanthos*
Kentucky coffeetree	*Gymnocladus dioicus*
Butternut	*Juglans cinerea*
Black walnut	*J. nigra*
Sweetgum	*Liquidambar styraciflua*
Yellow-poplar	*Liriodendron tulipifera*
Osage-orange	*Maclura pomifera*
Red mulberry	*Morus rubra*
Water tupelo	*Nyssa aquatica*
American sycamore (Buttonwood)	*Platanus americana*
Eastern cottonwood	*Populus deltoides*
Bigtooth aspen	*P. grandidentata*
Swamp cottonwood	*P. heterophylla*
Quaking aspen	*P. tremuloides*
Black cherry	*Prunus serotina*
White oak*	*Quercus alba*
Swamp white oak*	*Q. bicolor*
Scarlet oak	*Q. coccinea*
Southern red oak	*Q. falcata*
Cherrybark oak**	*Q. falcata var. pagodaefolia*
Overcup oak	*Q. lyrata*
Bur oak*	*Q. macrocarpa*
Swamp chestnut oak*	*Q. michauxii*
Chinkapin oak*	*Q. muehlenbergii*
Water oak	*Q. nigra*
Pin oak	*Q. palustris*
Willow oak	*Q. phellos*
Chestnut oak	*Q. prinus*
Northern red oak**	*Q. rubra*
Shumard oak**	*Q. shumardii*
Post oak	*Q. stellata*
Black oak	*Q. velutina*
Black locust	*Robinia pseudoacacia*
Willow species	*Salix spp.*
Sassafras	*Sassafras albidum*
Basswood	*Tilia americana*
Winged elm	*Ulmus alata*
American (white) elm	*U. americana*
Slippery elm	*U. rubra*
Rock elm	*U. thomasii*

** Select white oaks.
* Select red oaks.

Table 1.—*Area by land classes, Ohio, 1968*

Land class	Area	
	Thousand acres	*Percent*
Forest land:		
Commercial	6,329.2	24
Productive-reserved	76.1	[1]
Unproductive	—	—
Total	6,405.3	24
Nonforest:		
Cropland[2]	11,863.8	46
Pasture[2]	2,177.1	8
Other[3]	5,805.1	22
Total	19,846.0	76
Total area[4]	26,251.3	100

[1] Less than 0.5 percent.
[2] Source: 1964 Census of Agriculture.
[3] Includes swampland, industrial and urban areas, other nonforest land, and 80,500 acres classed as water by Forest Survey standards but defined by the Bureau of the Census as land.
[4] Source: United States Bureau of the Census, Area Management Reports, Ohio, 1960. Sept. 1967.
Sampling errors for major breakdowns of area for tables 1 to 9 are given in table 10.

Table 2.—*Area of commercial forest land, by ownership classes, Ohio, 1968*

Ownership class	Area	
	Thousand acres	*Percent*
National Forest	112.3	2
Other Federal	8.7	(*)
Total Federal	121.0	2
State	222.7	4
County and municipal	4.0	(*)
Total public	347.7	6
Forest industry:		
Pulp and paper	98.3	2
Lumber	17.6	(*)
Other	10.9	(*)
Total forest industry	126.8	2
Farmer-owned[1]	2,687.9	42
Miscellaneous private	3,166.8	50
Total private	5,981.5	94
All ownerships	6,329.2	100

*Less than 0.5 percent.
[1]Estimate based upon sample plots; not from Census of Agriculture.

Table 3.—*Area of commercial forest land, by stand-size and ownership classes, Ohio, 1968*

(In thousands of acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
Sawtimber stands	1,948.1	56.9	119.9	59.4	1,711.9
Poletimber stands	690.1	11.1	34.3	14.9	629.8
Sapling and seedling stands	3,517.3	28.5	78.1	52.5	3,358.2
Nonstocked areas	173.7	15.8	3.1	—	154.8
All classes	6,329.2	112.3	235.4	126.8	5,854.7

Table 4.—*Area of commercial forest land, by stand-volume and ownership classes, Ohio, 1968*

(In thousands of acres)

Stand volume per acre (board feet)[1]	All ownerships	National Forest	Other public	Forest industry	Farmer private and misc.
Less than 1,500	3,079.9	44.3	72.2	34.2	2,929.2
1,500 to 5,000	2,320.9	34.8	64.7	55.6	2,165.8
More than 5,000	928.4	33.2	98.5	37.0	759.7
All classes	6,329.2	112.3	235.4	126.8	5,854.7

[1] International ¼-inch rule.

Table 5.—*Area of commercial forest land, by stocking classes based on selected stand components, Ohio, 1968*

(In thousands of acres)

Stocking class (percent)	Stocking classified in terms of —				
	All trees	Growing-stock trees	Desirable trees	Acceptable trees	Rough and rotten trees
160	24.3	—	—	—	—
150 to 160	73.6	7.5	—	3.3	—
140 to 150	420.1	16.9	—	19.0	25.4
130 to 140	759.2	69.6	4.2	55.6	7.9
120 to 130	1,137.0	192.5	—	120.5	18.1
110 to 120	1,250.6	326.4	—	300.4	12.5
100 to 110	904.1	635.6	—	461.7	54.4
90 to 100	706.4	701.0	—	588.6	113.9
80 to 90	403.9	829.3	2.9	823.4	174.3
70 to 80	264.1	806.5	1.6	916.1	336.4
60 to 70	127.6	761.6	11.4	823.6	524.7
50 to 60	110.0	708.5	32.2	744.0	651.2
40 to 50	53.3	481.3	58.4	582.9	863.9
30 to 40	80.6	357.5	203.6	380.1	1,083.1
20 to 30	7.1	260.3	354.2	283.5	1,127.1
10 to 20	7.3	86.0	1,096.4	116.8	884.6
Less than 10	—	88.7	4,564.3	109.7	451.7
Total	6,329.2	6,329.2	6,329.2	6,329.2	6,329.2

Table 5a.—*Percent of commercial forest land, by stocking classes based on selected stand components, Ohio, 1968*

Level of stocking	Stocking in terms of selected stand components expressed as a percent of all stands			
	All trees	Growing-stock trees	Desirable trees	Acceptable trees
Overstocked	20	2	(1)	1
Fully stocked	52	18	—	14
Medium stocking	22	37	(1)	37
Poorly stocked and nonstocked	6	43	100	48
All levels	100	100	100	100

[1] Less than 0.5 percent.

Table 6.—*Area of commercial forest land, by area condition and ownership classes, Ohio, 1968*

(In thousands of acres)

Area-condition class[1]	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
Class 10	4.2	—	—	4.2	—
Class 20	—	—	—	—	—
Class 30	—	—	—	—	—
Class 40	10.4	1.6	2.6	—	6.2
Class 50	916.9	—	42.1	29.2	845.6
Class 60	3,137.9	34.8	118.0	73.4	2,911.7
Class 70	2,259.8	75.9	72.7	20.0	2,091.2
All classes	6,329.2	112.3	235.4	126.8	5,854.7

[1] Area-condition classes are defined as follows:

Class 10.—Areas fully stocked with desirable trees and not overstocked.

Class 20.—Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.—Areas medium to fully stocked with desirable trees, and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface condition that will prevent occupancy by desirable trees.

Class 40.—Areas medium to fully stocked with desirable trees and with 30 percent or more of the area controlled by other trees and/or conditions that ordinarily prevent occupancy by desirable trees.

Class 50.—Areas poorly stocked with desirable trees, but fully stocked with growing-stock trees.

Class 60.—Areas poorly stocked with desirable trees but with medium to full stocking of growing-stock trees.

Class 70.—Areas poorly stocked with desirable trees, and poorly stocked with growing-stock trees.

Table 7.—*Area of commercial forest land, by site and ownership classes, Ohio, 1968*

(In thousands of acres)

Site class (cubic feet per acre)	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
165 or more	—	—	—	—	—
120 to 165	600.00	—	44.6	6.5	548.9
85 to 120	1,059.2	4.8	51.2	22.4	980.8
50 to 85	2,613.4	91.7	65.0	53.0	2,403.7
Less than 50	2,056.6	15.8	74.6	44.9	1,921.3
All classes	6,329.2	112.3	235.4	126.8	5,854.7

Table 8.—*Area of commercial forest land by forest types and ownership classes, Ohio, 1968*

(In thousands of acres)

Forest type	All ownerships	Public ownerships	Private ownerships
White-red pine-hemlock	54.3	7.6	46.7
Spruce-fir[1]	19.2	—	19.2
Virginia-pitch pine	206.0	31.0	175.0
Oak-pine	478.7	10.7	468.0
Oak-hickory	2,953.8	246.2	2,707.6
Oak-gum	26.0	—	26.0
Elm-ash-red maple	1,376.0	22.6	1,353.4
Maple-beech-birch	1,151.6	20.5	1,131.1
Aspen-birch	63.6	9.1	54.5
All types	6,329.2	347.7	5,981.5

[1] In Ohio this type is composed entirely of spruce plantations.

Table 9.—*Area of noncommercial forest land, by forest types, Ohio, 1968*

(In thousands of acres)

Forest types	All areas	Productive-reserved areas	Unproductive areas
Softwood types	2.6	2.6	—
Oak types	48.6	48.6	—
Maple-beech-birch	16.2	16.2	—
Other hardwood types	8.7	8.7	—
All types	76.1	76.1	—

Table 10.—*Sampling errors, in percent, for major area breakdowns in Ohio, 1968*

Table no.	Area breakdown classification	Sampling error
1	Forest land area:	
	Commercial	1.6
	Unproductive	—
	Total	1.6
2	Ownership:[1]	
	Farmer-owned	4
	Misc. private	3
	Forest industry	16
	Farmer & misc. private	2
3	Stand-size class:	
	Sawtimber	4
	Poletimber	7
	Sapling and seeedling	3
	Nonstocked	19
4	Stand-volume per acre:	
	Less than 1,500 board feet	3
	1,500 to 5,000 board feet	4
	More than 5,000 board feet	7
5	Area-condition class:	
	1	(**)
	2 & 3	—
	4	(*)
	5	7
	6	3
	7	4
6	Growth-per-acre class:	
	More than 120 cubic feet	10
	85 to 120 cubic feet	7
	50 to 85 cubic feet	4
	Less than 50 cubic feet	4
7	Forest types:	
	White-red pine-hemlock	30
	Spruce-fir	(*)
	Virginia-pitch pine	14
	Oak-pine	12
	Oak-hickory	3
	Oak-gum-cypress	42
	Elm-ash-red maple	6
	Maple-beech-birch	7
	Aspen-birch	27

* Sampling errors of 50 to 99 percent.

** Sampling errors of 100 percent or more.

[1] There are no sampling errors for areas in public ownership because acreages were obtained from public records.

Table 11.—*Number of growing-stock trees on commercial forest land, by diameter classes and by softwoods and hardwoods, Ohio, 1968*

(In thousands of trees)

D.b.h. class (inches)	All species	Softwoods	Hardwoods
1.0- 2.9	860,452	36,377	824,075
3.0- 4.9	335,054	23,277	311,777
5.0- 6.9	159,578	9,374	150,204
7.0- 8.9	100,651	5,273	95,378
9.0-10.9	62,420	2,464	59,956
11.0-12.9	40,393	1,116	39,277
13.0-14.9	25,601	447	25,154
15.0-16.9	15,343	109	15,234
17.0-18.9	8,641	80	8,561
19.0-28.9	9,645	22	9,623
29.0 and larger	676	—	676
All classes	1,618,454	78,539	1,539,915

Table 12.—*Number of cull and growing-stock trees on commercial forest land, by diameter groups and by softwoods and hardwoods, Ohio 1968*

(In thousands of trees)

D.b.h. class (inches)	All trees[1]	Cull trees	Growing-stock trees
Softwoods:			
5.0 to 8.9	17,283	2,636	14,647
9.0 to 18.9	4,677	461	4,216
19.0 and larger	22	—	22
Total	21,982	3,097	18,885
Hardwoods:			
5.0 to 10.9	422,352	116,814	305,538
11.0 to 18.9	109,617	21,391	88,226
19.0 and larger	16,396	6,097	10,299
Total	548,365	144,302	404,063
All species	570,347	147,399	422,948

[1]Number of salvable dead trees is negligible; therefore this item is omitted.

Table 13.—*Net volume of timber on commercial forest land, by class of timber, and softwoods and hardwoods, Ohio, 1968*

(In millions of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	2,188.4	54.2	2,134.2
Upper-stem portion	495.2	8.2	487.0
Total	2,683.6	62.4	2,621.2
Poletimber trees	1,497.3	53.5	1,443.8
All growing-stock trees	4,180.9	115.9	4,065.0
Rough trees	391.6	7.2	384.4
Rotten trees	283.7	1.6	282.1
Total, all timber	4,856.2	124.7	4,731.5

Sampling errors for major breakdowns of timber volume for tables 13 to 18 are given in table 19.

Table 14.—*Net volume of growing stock and sawtimber on commercial forest land, by ownership classes, and softwoods and hardwoods, Ohio, 1968*

Ownership class	Growing stock *(million cubic feet)*			Sawtimber *(million board feet)*[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	100.9	8.1	92.8	366.0	22.1	343.9
Other public	251.6	10.8	240.8	916.3	33.7	882.6
Forest industry	116.5	4.4	112.1	425.9	18.2	407.7
Farmer and misc. private	3,711.9	92.6	3,619.3	12,843.4	275.5	12,567.9
All ownerships	4,180.9	115.9	4,065.0	14,551.6	349.5	14,202.1

[1] International ¼-inch rule.

Table 15.—*Volume of growing stock and sawtimber on commercial forest land, by stand-size classes and by softwoods and hardwoods, Ohio, 1968*

Stand-size class	Growing stock *(million cubic feet)*			Sawtimber *(million board feet)*[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Sawtimber stands	2,427.5	40.4	2,387.1	10,049.1	168.0	9,881.1
Poletimber stands	643.5	45.9	597.6	1,362.5	92.6	1,269.9
Sapling and seedling stands	1,097.3	29.6	1,067.7	3,106.7	88.9	3,017.8
Nonstocked areas	12.6	—	12.6	33.3	—	33.3
Total	4,180.9	115.9	4,065.0	14,551.6	349.5	14,202.1

[1] International ¼-inch rule.

Table 16.—*Net volume of growing stock on commercial forest land, by species and diameter classes, Ohio, 1968*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	26.1	7.7	9.4	4.1	2.9	1.2	0.6	—	—	0.2	—
Virginia pine	51.0	6.3	14.1	13.2	10.4	5.5	.5	1.0	—	—	—
Other yellow pines	23.8	4.3	5.2	4.5	3.5	2.6	1.8	1.5	0.2	.2	—
Hemlock	7.7	.8	1.8	1.8	1.3	.5	.3	.5	—	.7	—
Other softwoods	7.3	2.3	1.6	2.1	.6	.4	—	—	—	—	0.3
Total softwoods	115.9	21.4	32.1	25.7	18.7	10.2	3.2	3.0	.2	1.1	.3
Select white oaks	593.0	29.0	51.2	74.3	90.1	95.7	73.2	53.3	31.2	72.0	23.0
Select red oaks	312.9	13.9	28.9	34.5	36.3	33.1	31.7	34.0	21.6	65.5	13.4
Chestnut oak[1]	252.0	14.4	30.0	43.1	47.6	38.0	33.1	18.3	12.1	14.7	.7
Other red oaks	432.2	12.7	34.5	56.3	63.5	61.7	56.0	51.5	30.8	52.7	12.5
Hickory species	482.5	50.3	92.8	87.6	86.1	63.1	44.2	27.4	17.6	13.4	—
Hard maple	239.9	25.3	37.1	33.5	37.0	36.4	24.4	16.5	9.5	17.1	3.1
Soft maple	227.4	25.9	35.3	40.5	24.5	27.9	18.7	19.3	8.7	18.7	7.9
Beech	150.1	8.5	10.8	13.0	20.4	15.6	17.6	14.4	16.6	28.5	4.7
Ash species	269.4	26.3	31.6	40.9	46.6	39.4	32.3	18.6	16.9	16.3	.5
Aspen and cottonwood	55.0	13.2	14.1	6.8	6.0	5.9	3.2	.9	.3	1.3	3.3
Basswood	47.3	1.8	1.9	8.4	7.6	7.3	7.5	5.2	2.5	2.7	2.4
Yellow-poplar	265.8	16.3	27.8	35.8	40.0	45.9	38.1	22.2	14.0	23.0	2.7
Black walnut[2]	98.8	11.3	14.6	18.6	16.9	11.6	13.9	4.9	4.4	2.6	—
Black cherry	122.1	15.3	26.2	23.3	21.4	16.9	10.8	3.7	2.3	2.2	—
Sycamore	78.0	3.1	4.5	5.4	6.0	7.4	11.7	8.2	7.0	11.1	13.6
Black locust	45.6	10.5	11.6	10.9	4.0	4.0	1.3	2.8	.5	—	—
Elm	243.9	26.8	39.1	42.9	36.6	31.6	27.1	15.0	7.1	9.5	8.2
Sassafras	30.4	10.1	10.8	3.6	3.1	1.9	.2	.7	—	—	—
Other hardwoods	118.7	10.9	20.0	16.0	17.8	15.3	12.4	12.6	5.5	5.8	2.4
Total hardwoods	4,065.0	325.6	522.8	595.4	611.5	558.7	457.4	329.5	208.6	357.1	98.4
All species	4,180.9	347.0	554.9	621.1	630.2	568.9	460.6	332.5	208.8	358.2	98.7

[1] Includes 6.0 million cubic feet of other white oaks.

[2] In addition there are 14.7 million cubic feet of black walnut on noncommercial and nonforest land.

Table 17.—*Net volume of sawtimber on commercial forest land, by species and diameter classes, Ohio, 1968*
(In millions of board feet)[1]

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	51.4	21.9	17.2	7.1	3.8	—	—	1.4	—
Virginia pine	167.7	67.0	57.8	33.0	3.1	6.8	—	—	—
Other yellow pines	81.5	21.8	20.3	15.9	11.8	9.2	1.6	.9	—
Hemlock	28.5	9.1	7.3	2.9	1.5	3.5	—	4.2	—
Other softwoods	20.4	11.8	3.8	2.9	—	—	—	—	1.9
Total softwoods	349.5	131.6	106.4	61.8	20.2	19.5	1.6	6.5	1.9
Select white oaks	2,359.6	—	482.5	528.0	397.2	282.9	170.8	382.5	115.7
Select red oaks	1,239.6	—	178.4	177.9	166.4	180.1	117.9	348.6	70.3
Chestnut oak[2]	846.4	—	236.6	195.5	173.6	94.1	64.3	78.5	3.8
Other red oaks	1,735.0	—	313.3	331.6	296.3	275.7	170.4	285.1	62.6
Hickory species	1,245.1	—	414.0	313.0	221.9	137.0	90.2	69.0	—
Hard maple	810.3	—	204.2	207.2	141.1	93.3	55.6	92.4	16.5
Soft maple	782.4	—	147.9	174.5	116.1	122.7	56.4	118.6	46.2
Beech	777.4	—	134.3	106.3	119.1	94.1	110.8	182.2	30.6
Ash species	857.7	—	233.2	198.0	164.2	92.5	86.8	80.4	2.6
Aspen and cottonwood	108.8	—	31.2	31.1	17.5	5.1	1.3	6.9	15.7
Basswood	183.7	—	38.4	39.0	40.3	27.5	14.3	13.7	10.5
Yellow-poplar	1,099.1	—	228.8	271.3	226.1	132.2	85.2	139.1	16.4
Black walnut[3]	300.0	—	92.5	67.3	78.9	25.2	22.4	13.7	—
Black cherry	297.7	—	106.9	88.0	57.6	20.4	13.4	11.4	—
Sycamore	342.6	—	32.4	39.9	63.9	43.3	38.4	58.3	66.4
Black locust	69.4	—	21.3	22.1	7.1	16.0	2.9	—	—
Elm	740.5	—	201.3	174.1	150.7	82.7	38.9	50.7	42.1
Sassafras	32.0	—	16.8	9.9	1.2	4.1	—	—	—
Other hardwoods	374.8	—	92.0	81.6	65.4	66.1	28.5	30.4	10.8
Total hardwoods	14,202.1	—	3,206.0	3,056.3	2,504.6	1,795.0	1,168.5	1,961.5	510.2
All species	14,551.6	131.6	3,312.4	3,118.1	2,524.8	1,814.5	1,170.1	1,968.0	512.1

[1] International ¼-inch rule.
[2] Includes 21.3 million board feet of other white oaks.
[3] In addition there are 26.4 million board feet of black walnut on noncommercial and nonforest land.

Table 18.—*Net volume of sawtimber on commercial forest land, by species and quality classes, Ohio, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			Other logs[2]
		Grade 1	Grade 2	Grade 3	
Softwoods:					
Virginia pine	167.7	1.3	7.3	118.9	40.2
Yellow pines	81.5	2.6	15.1	44.1	19.7
White and red pine	51.4	—	—	34.2	17.2
Hemlock	28.5	—	—	—	—
Other softwoods	20.4	—	—	—	—
Total	349.5	3.9	22.4	197.2	77.1
Hardwoods:					
Select white oaks	2,359.6	261.0	595.6	1,133.8	369.2
Select red oaks	1,239.6	288.7	299.3	508.6	143.0
Chestnut oak[3]	846.4	96.3	221.5	396.7	131.9
Other red oaks	1,735.0	273.4	319.5	792.7	349.4
Hickory species	1,245.1	87.2	194.6	586.2	377.1
Hard maple	810.3	66.6	156.6	454.5	132.6
Soft maple	782.4	47.7	162.2	414.0	158.5
Beech	777.4	24.3	124.2	415.8	213.1
Ash species	857.7	134.0	194.4	368.4	160.9
Aspen and cottonwood	108.8	13.5	17.0	46.2	32.1
Basswood	183.7	14.9	39.8	113.5	15.5
Yellow-poplar	1,099.1	216.4	228.4	441.5	212.8
Black walnut	300.0	28.8	62.8	174.8	33.6
Black cherry	297.7	22.4	31.6	164.5	79.2
Sycamore	342.6	92.1	83.8	132.1	34.6
Black locust	69.4	3.2	7.5	48.0	10.7
Elm	740.5	53.8	151.9	412.0	122.8
Sassafras	32.0	.7	4.4	22.9	4.0
Other hardwoods	374.8	47.4	78.2	192.7	56.5
Total	14,202.1	1,772.4	2,973.3	6,818.9	2,637.5

[1] International ¼-inch rule.

[2] For white, red, and yellow pines "other" is grade 4; for hardwoods "other" is tie and timber logs. Other softwood species were not graded. For a discussion of log grades see the appendix.

[3] Includes a small volume of other white oaks.

Table 19.—*Sampling errors, in percent, for major timber volume breakdowns in Ohio, 1968*

Table no.	Volume breakdown classification	Sampling errors
		Percent
13	Class of timber (cubic feet):	
	Softwood growing stock	14
	Hardwood growing stock	2
	Sawtimber trees	2
	Poletimber trees	3
	All growing stock	1.5
	Rough trees	5
	Rotten trees	5
	All live trees	1.4
14	Ownership classes:	
	Growing stock (cubic feet)	
	National Forest	9
	Other public	28
	Forest industry	18
	Farmer & misc. pvt.	2
	Sawtimber (board feet)	
	National forest	11
	Other public	31
	Forest industry	19
	Farmer & misc. pvt.	2
	Softwood sawtimber	15
	Hardwood sawtimber	2
	All sawtimber	1
15	Stand-size classes:	
	Growing stock (cubic feet)	
	Sawtimber stands	3
	Poletimber stands	8
	Sapling and seedling	5
	Nonstocked	34
	Sawtimber (board feet)	
	Sawtimber stands	3
	Poletimber stands	9
	Sapling and seedling	6
	Nonstocked	45

Table no.	Volume breakdown classification	Sampling errors Cu. ft.	Bd. ft.
		Percent	
16-17	Species:		
	White & red pine	38	65
	Virginia pine	16	18
	Other yellow pines	26	21
	Hemlock	*	*
	Other softwoods	43	*
	Select white oaks	5	6
	Select red oaks	7	7
	Chestnut oak	8	9
	Other red oaks	6	6
	Hickory species	6	8
	Hard maple	10	13
	Soft maple	10	13
	Beech	13	14
	Ash species	7	8
	Yellow-poplar	8	9
	Aspen and cottonwood	15	28
	Elm	7	10
	Sassafrass	14	26
	Basswood	20	22
	Black walnut	9	12
	Black cherry	9	12
	Sycamore	19	22
	Black locust	13	23
	Other hardwoods	9	12
16-17	Diameter classes:		
	(inches)	*Cu. ft.*	*Bd. ft.*
	5-0- 6-9	4	—
	7-0- 8.9	3	—
	9.0-10.9[1]	3	27
	11.0-12.9	3	3
	13.0-14.9	3	4
	15.0-16.9	1	3
	17.0-18.9	4	4
	19.0-20.9	6	5
	21.0-28.9	6	6
	29.0 and larger	14	13

[1] Board-foot sampling error for this class is for softwoods only.
* Sampling errors of 50 to 99 percent.

Table 20.—*Average net annual growth and removals of growing stock on commercial forest land, by species, Ohio, 1951-1967*

(In thousands of cubic feet)

Species	Average net annual growth	Average annual timber removals
Softwoods:		
Yellow pines	2,884	2,700
White and red pine	860	—
Other softwoods	456	—
Total	4,200	2,700
Hardwoods:		
Select white and red oaks	29,496	13,823
Other white and red oaks	23,176	15,703
Hickory	12,799	3,201
Hard maple	8,577	2,414
Soft maple	6,638	1,054
Beech	2,291	2,825
Ash, walnut, and black cherry	21,347	7,607
Yellow-poplar	14,330	2,386
Other hardwoods	9,946	18,787
Total	128,600	67,800
All species	132,800	70,500

Sampling errors for major breakdowns of average net annual growth, removals, and mortality for tables 20 to 26 are given in table 27.

Table 21.—*Average net annual growth and removals of growing stock on commercial forest land, by ownership classes, and softwoods and hardwoods, Ohio, 1951-1967*

(In thousands of cubic feet)

Ownership	Average net annual growth			Average annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National forest	3,636	309	3,327	1,067	69	998
Other public	8,121	412	7,709	1,821	118	1,703
Forest industry	4,187	168	4,019	1,215	79	1,136
Farmer and misc. private	116,856	3,311	113,545	66,397	2,434	63,963
All ownerships	132,800	4,200	128,600	70,500	2,700	67,800

Table 22.—*Average net annual growth and removals of sawtimber on commercial forest land, by species, Ohio, 1951-1967*

(In thousands of board feet)[1]

Species	Average net annual growth	Average annual timber removals
Softwoods:		
Yellow pines	10,910	12,500
White and red pine	1,648	—
Other softwoods	1,442	—
Total	14,000	12,500
Hardwoods:		
Select white and red oaks	107,335	47,528
Other white and red oaks	78,620	50,667
Hickory	41,876	7,408
Hard maple	24,748	9,171
Soft maple	20,748	3,889
Beech	12,870	11,350
Ash, walnut, and black cherry	48,229	22,944
Yellow-poplar	58,972	8,573
Other, hardwoods	14,602	35,470
Total	408,000	197,000
All species	422,000	209,500

[1] International ¼-inch rule.

Table 23.—*Average net annual growth and removals of sawtimber on commercial forest land, by ownership classes, and softwoods and hardwoods, Ohio, 1951-1967*

(In thousands of board feet)[1]

Ownership	Average net annual growth			Average annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	12,795	915	11,880	3,363	320	3,043
Other public	26,873	1,395	25,478	5,740	547	5,193
Forest industry	14,837	753	14,084	3,829	365	3,464
Farmer and misc. private	367,495	10,937	356,558	196,568	11,268	185,300
All ownerships	422,000	14,000	408,000	209,500	12,500	197,000

[1] International ¼-inch rule.

Table 24.—*Average annual mortality of growing stock and sawtimber on commercial forest land, by species, Ohio, 1951-1967*

Species	Growing stock	Sawtimber
	(thousand cubic feet)	*(thousand board feet)*[1]
Softwoods:		
Yellow pines	1,300	4,000
White and red pine	—	—
Total	1,300	4,000
Hardwoods:		
Select white and red oaks	2,081	4,992
Other white and red oaks	3,045	6,441
Hickory	1,427	2,392
Hard maple	307	972
Soft maple	484	—
Beech	82	406
Ash, walnut and black cherry	2,187	4,964
Yellow-poplar	629	1,578
Other hardwoods	15,458	47,255
Total	25,700	69,000
All species	27,000	73,000

[1] International ¼-inch rule.

Table 25.—*Average annual mortality of growing stock and sawtimber on commercial forest land, by ownership classes, and softwoods and hardwoods, Ohio, 1951-1967*

Ownership	Growing stock *(thousand cubic feet)*			Sawtimber *(thousand board feet)*[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	550	95	455	1,373	252	1,121
Other public	1,616	146	1,470	4,590	390	4,200
Forest industry	609	52	557	1,563	207	1,356
Farmer and misc. private	24,225	1,007	23,218	65,474	3,151	62,323
All ownerships	27,000	1,300	25,700	73,000	4,000	69,000

[1] International ¼-inch rule.

Table 26.—*Average annual mortality of growing stock and sawtimber on commercial forest land, by causes, and softwoods and hardwoods, Ohio, 1951-1967*

Cause	Growing stock *(thousand cubic feet)*			Sawtimber *(thousand board feet)*[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Fire	557	—	557	1,860	—	1,860
Insects	303	—	303	230	—	230
Disease	18,719	767	17,952	54,505	2,011	52,494
Other	1,920	—	1,920	3,385	—	3,385
Unknown	5,501	533	4,968	13,020	1,989	11,031
All causes	27,000	1,300	25,700	73,000	4,000	69,000

[1] International ¼-inch rule.

Table 27.—*Sampling errors, in percent, for major breakdowns of annual growth, removals, and mortality of growing stock and sawtimber, Ohio, 1967*

Table no.	Breakdown classification	Sampling errors
		Percent
20	Growth in cubic feet:	
	Softwoods	39
	Hardwoods	9
	All species	9
	Removals in cubic feet:	
	Softwoods	(*)
	Hardwoods	14
	All species	14
21	Growth in cubic feet:	
	Public	30
	Forest industry	(*)
	Farmer & misc private	9
	Removals in cubic feet:	
	Public	(*)
	Forest industry	(*)
	Farmer & misc. private	15
22	Growth in board feet:	
	Softwoods	39
	Hardwoods	9
	All species	9
	Removals in board feet:	
	Softwoods	(**)
	Hardwoods	13
	All species	13

Table no.	Breakdown classification	Sampling error	
		Percent	
23	Growth in board feet:		
	Public	28	
	Forest industry	(*)	
	Farmer & misc. private	10	
	Removals in board feet:		
	Public	(*)	
	Forest industry	(*)	
	Farmer & misc. private	14	
24	Mortality by species group:		
		Cu. ft.	*Bd. ft.*
	Softwoods	(*)	(*)
	Hardwoods	9	12
	All species	9	12
25	Mortality by owner:		
	Public	42	48
	Forest industry	(*)	(**)
	Farmer & misc. pvt.	10	13
26	Mortality by cause:		
	Fire	(*)	(*)
	Insect	(*)	(**)
	Disease	11	15
	Other	24	41
	Unknown	21	31

* Sampling errors of 50 to 99 percent.
** Sampling errors of 100 percent and more.

Table 28.—*Output of timber products, by source of material and softwoods and hardwoods, Ohio, 1966*

Product and species group	Standard units	Total output		Roundwood products		Plant byproducts	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
Sawlogs:							
Softwood	M board feet[1]	3,406	521	3,406	521	—	—
Hardwood	M board feet[1]	386,325	59,439	386,325	59,439	—	—
Total	M board feet[1]	389,731	59,960	389,731	59,960	—	—
Veneer logs and bolts:							
Softwood	M board feet	—	—	—	—	—	—
Hardwood	M board feet	6,712	1,032	6,712	1,032	—	—
Total	M board feet	6,712	1,032	6,712	1,032	—	—
Pulpwood:							
Softwood	Standard cords[2]	10,400	832	10,400	832	—	—
Hardwood	Standard cords[2]	365,100	29,208	326,300	26,104	38,800	3,104
Total	Standard cords[2]	375,500	30,040	336,700	26,936	38,800	3,104
Cooperage:							
Softwood	M board feet	—	—	—	—	—	—
Hardwood	M board feet	11,041	1,697	11,041	1,697	—	—
Total	M board feet	11,041	1,697	11,041	1,697	—	—
Piling:							
Softwood	M linear feet	—	—	—	—	—	—
Hardwood	M linear feet	—	—	—	—	—	—
Total	M linear feet	—	—	—	—	—	—

Poles:							
Softwood	M pieces	5	12	5	12	—	—
Hardwood	M pieces	—	—	—	—	—	—
Total	M pieces	5	12	5	12	—	—
Mine timbers (round):							
Softwood	M cubic feet	203	203	203	203	—	—
Hardwood	M cubic feet	807	807	807	807	—	—
Total	M cubic feet	1,010	1,010	1,010	1,010	—	—
Posts (round and split):							
Softwood	M pieces	190	146	190	146	—	—
Hardwood	M pieces	1,250	720	1,250	720	—	—
Total	M pieces	1,440	866	1,440	866	—	—
Other:[3]							
Softwood	M cubic feet	13	13	—	—	13	13
Hardwood	M cubic feet	10,833	10,833	5,068	5,068	5,765	5,765
Total	M cubic feet	10,846	10,846	5,068	5,068	5,778	5,778
Total industrial products:							
Softwood	—	—	1,727	—	1,714	—	13
Hardwood	—	—	103,736	—	94,867	—	8,869
Total	—	—	105,463	—	96,581	—	8,882
Fuelwood:							
Softwood	Standard cords	650	52	—	—	650	52
Hardwood	Standard cords	173,425	13,874	103,000	8,240	70,425	5,634
Total	Standard cords	174,075	13,926	103,000	8,240	71,075	5,686

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Table 28.—Continued

Product and special group	Standard units	Total output		Roundwood products		Plant byproducts	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
All products:							
Softwood	—	—	1,779	—	1,714	—	65
Hardwood	—	—	117,610	—	103,107	—	14,503
Total	—	—	119,389	—	104,821	—	14,568

[1] International ¼-inch rule.
[2] Rough-wood basis (includes chips converted to equivalent standard cords).
[3] Includes hewn ties, excelsior bolts, shingle bolts, turnery bolts, chemical wood, etc.

Table 29.—*Output of roundwood products by source, and softwoods and hardwoods, Ohio, 1966*

(In thousands of cubic feet)

Product and species group	All sources	Growing-stock trees[1]			Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[2]
		Total	Sawtimber	Poletimber			
Industrial products:							
Sawlogs:							
Softwood	521	521	521	—	—	—	—
Hardwood	59,439	55,424	55,252	172	602	1,209	2,204
Total	59,960	55,945	55,773	172	602	1,209	2,204
Veneer logs and bolts:							
Softwood	—	—	—	—	—	—	—
Hardwood	1,032	990	990	—	42	—	—
Total	1,032	990	990	—	42	—	—
Pulpwood:							
Softwood	832	713	238	475	48	—	71
Hardwood	26,104	21,665	17,019	4,646	576	2,278	1,585
Total	26,936	22,378	17,257	5,121	624	2,278	1,656
Misc. industrial products:							
Cooperage:							
Softwood	—	—	—	—	—	—	—
Hardwood	1,697	1,639	1,639	—	58	—	—
Total	1,697	1,639	1,639	—	58	—	—

CONTINUED

Table 29.—Continued

Product and species group	All sources	Growing-stock trees[1]			Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[2]
		Total	Sawtimber	Poletimber			
Piling:							
Softwood	—	—	—	—	—	—	—
Hardwood	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—
Poles:							
Softwood	12	12	4	8	—	—	—
Hardwood	—	—	—	—	—	—	—
Total	12	12	4	8	—	—	—
Mine timbers (round):							
Softwood	203	147	27	120	22	—	34
Hardwood	807	670	526	144	18	70	49
Total	1,010	817	553	264	40	70	83
Posts (round and split):							
Softwood	146	100	30	70	1	7	38
Hardwood	720	597	469	128	16	63	44
Total	866	697	499	198	17	70	82

Other:							
Softwood	—	—	—	—	—	—	—
Hardwood	5,068	4,206	3,304	902	112	442	308
Total	5,068	4,206	3,304	902	112	442	308
All misc. industrial products:							
Softwood	361	259	61	198	23	7	72
Hardwood	8,292	7,112	5,938	1,174	204	575	401
Total	8,653	7,371	5,999	1,372	227	582	473
All industrial products:							
Softwood	1,714	1,493	820	673	71	7	143
Hardwood	94,867	85,191	79,199	5,992	1,424	4,062	4,190
Total	96,581	86,684	80,019	6,665	1,495	4,069	4,333
Fuelwood:							
Softwood	—	—	—	—	—	—	—
Hardwood	8,240	661	330	331	342	2,264	4,973
Total	8,240	661	330	331	342	2,264	4,973
All products:							
Softwood	1,714	1,493	820	673	71	7	143
Hardwood	103,107	85,852	79,529	6,323	1,766	6,326	9,163
Total	104,821	87,345	80,349	6,996	1,837	6,333	9,306

[1] On commercial forest land.

[2] Includes trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas or material from noncommercial forest land or nonforest land such as fence rows or suburban areas.

Table 30.—*Timber removals from growing stock on commercial forest land, by items, softwoods and hardwoods, Ohio, 1966*

(In thousands of cubic feet)

Item	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	55,945	521	55,424
Veneer logs and bolts	990	—	990
Pulpwood	22,378	713	21,665
Cooperage logs and bolts	1,639	—	1,639
Piling	—	—	—
Poles	12	12	—
Mine timbers	817	147	670
Posts	697	100	597
Other	4,206	—	4,206
Fuelwood	661	—	661
All products	87,345	1,493	85,852
Logging residues	21,406	84	21,322
Other removals	—	—	—
Total removals	108,751	1,577	107,174

Table 31.—*Timber removals from live sawtimber on commercial forest land, by items, softwoods and hardwoods, Ohio, 1966*

(In thousands of board feet)[1]

Item	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	335,654	2,674	332,980
Veneer logs and bolts	5,966	—	5,966
Pulpwood	86,069	1,128	84,941
Cooperage logs and bolts	10,659	—	10,659
Piling	—	—	—
Poles	18	18	—
Mine timbers	2,783	158	2,625
Posts	2,476	135	2,341
Other	16,490	—	16,490
Fuelwood	1,647	—	1,647
All products	461,762	4,113	457,649
Logging residues	83,464	52	83,412
Other removals	—	—	—
Total removals	545,226	4,165	541,061

[1] International ¼-inch rule.

Table 32.—*Volume of unused residues at primary manufacturing plants, by industry and type of residue, softwoods and hardwoods, Ohio, 1966*

(In thousands of cubic feet)

Species group and type of residues	All industries	Lumber	Veneer and plywood	Other
Softwoods:				
Coarse[1]	105	105	—	—
Fine[2]	64	64	—	—
Total	169	169	—	—
Hardwoods:				
Coarse	6,151	5,975	16	160
Fine	7,890	7,435	93	362
Total	14,041	13,410	109	522
All species:				
Coarse	6,256	6,080	16	160
Fine	7,954	7,499	93	362
Total	14,210	13,579	109	522

[1] Material such as slabs, edgings, and veneer cores.
[2] Material such as sawdust and shavings.

Table 33.—*Timber growth projections, Ohio, 1968-98*

Item	1968 (inventory year)	1978	1988	1998
Assumption:[1] Growth equals timber removals in 1998				
		GROWING STOCK *Million cubic feet*		
All species[2]				
Growth	149	199	248	292
Removals	109	173	235	292
Inventory	4,181	4,511	4,714	4,786
		SAWTIMBER *Million board feet*[3]		
Growth	487	504	503	489
Removals	401	598	712	730
Inventory	14,552	14,392	12,866	10,564
Assumption: Timber removals will continue on the 1952-68 trend				
		GROWING STOCK *Million cubic feet*		
All species:				
Growth	149	204	274	359
Removals	109	136	172	202
Inventory	4,181	4,698	5,535	6,793
		SAWTIMBER *Million board feet*		
Growth	487	525	597	725
Removals	401	474	534	554
Inventory	14,552	15,063	15,612	16,662

[1] For a discussion of the assumptions used in these projections see section "Timber Supply Outlook."

[2] Separate projections for softwoods and hardwoods were not made because of the small volume of softwood in Ohio.

[3] International ¼-inch rule.

Table 34.—*Land area of Ohio, by land classes and geographic units, 1968*

(In thousands of acres)

Land class	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
Commercial	1,541.7	1,272.7	1,566.9	1,020.3	927.6	6,329.2
Productive-reserved	5.6	8.8	20.8	25.4	15.5	76.1
Total forest land	1,547.3	1,281.5	1,587.7	1,045.7	943.1	6,405.3
Nonforest land	1,760.4	792.7	1,830.0	4,073.5	11,389.4	19,846.0
All land	3,307.7	2,074.2	3,417.7	5,119.2	12,332.5	26,251.3
	(Sampling errors, in percent)					
Commercial forest land	2	2	3	6	6	2

Table 35.—*Areas of commercial forest land in Ohio, by ownership classes and geographic units, 1968*

(In thousands of acres)

Ownership class	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
National Forest	49.0	59.0	4.3	—	—	112.3
Other federal	—	—	—	8.2	0.5	8.7
State	113.9	45.5	32.2	20.6	10.5	222.7
County and municipal	—	—	—	4.0	—	4.0
Total public	162.9	104.5	36.5	32.8	11.0	347.7
Pulp and paper industry	60.7	37.6	—	—	—	98.3
Lumber industry	5.7	3.7	8.2	—	—	17.6
Other forest industry	3.4	3.6	3.9	—	—	10.9
Total forest industry	69.8	44.9	12.1	—	—	126.8
Farmer-owned	570.5	514.9	587.6	429.1	585.8	2,687.9
Miscellaneous private	738.5	608.4	930.7	558.4	330.8	3,166.8
All ownerships	1,541.7	1,272.7	1,566.9	1,020.3	927.6	6,329.2
	(Sampling errors, in percent)[1]					
Forest industry	20	27	*	—	—	16
Farmer-owned	6	7	7	14	10	4
Miscellaneous private	5	6	5	11	16	3

[1] No sampling errors for area in public ownership. Areas were obtained from records.

* Sampling error 50 to 99 percent.

Table 36.—*Area of commercial forest land in Ohio, by stand-size classes and geographic units, 1968*

(In thousands of acres)

Geographic unit	Stand-size class				All classes
	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas	
South-central	494.7	225.3	798.9	22.8	1,541.7
Southeastern	397.2	153.6	680.7	41.2	1,272.7
East-central	367.3	179.5	966.8	53.3	1,566.9
Northeastern	339.4	99.1	535.8	46.0	1,020.3
Western	349.5	32.6	535.1	10.4	927.6
All units	1,948.1	690.1	3,517.3	173.7	6,329.2
	(Sampling errors, in percent)				
South-central	6	11	5	37	2
Southeastern	7	14	5	29	2
East-central	8	14	5	32	4
Northeastern	15	32	11	49	6
Western	14	(*)	10	(**)	7

* Sampling error between 50 and 99 percent.
** Sampling error 100 percent or more.

Table 37.—*Area of commercial forest land in Ohio, by stocking classes of growing-stock trees and geographic units, 1968*

(In thousands of acres)

Geographic unit	Stocking-percentage class				All classes
	Over 70 percent	40 to 70 percent	10 to 40 percent	Under 10 percent	
South-central	1,003.5	411.4	120.0	6.8	1,541.7
Southeastern	787.8	334.2	133.9	16.8	1,272.7
East-central	740.1	574.4	231.9	20.5	1,566.9
Northeastern	553.5	307.2	125.5	34.1	1,020.3
Western	500.4	324.2	92.5	10.5	927.6
All units	3,585.3	1,951.4	703.8	88.7	6,329.2

Table 38.—*Area of commercial forest land in Ohio, by area-condition classes and geographic units, 1968*

(In thousands of acres)

Area-condition class[1]	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
Class 10	—	—	4.2	—	—	4.2
Class 20	—	—	—	—	—	—
Class 30	—	—	—	—	—	—
Class 40	6.4	3.9	.1	—	—	10.4
Class 50	301.1	248.1	140.3	132.5	94.9	916.9
Class 60	857.0	633.5	689.7	446.8	510.9	3,137.9
Class 70	377.2	387.2	732.6	441.0	321.8	2,259.8
All classes	1,541.7	1,272.7	1,566.9	1,020.3	927.6	6,329.2

[1] Area-condition classes are briefly described as follows:

Class 10—Areas 100 percent or more stocked with desirable trees and not overstocked.

Class 20—Areas 100 percent or more stocked with desirable trees and overstocked.

Class 30—Areas 60 to 100 percent stocked with desirable trees, and with less than 30 percent of the area controlled by growing-stock trees, cull trees, inhibiting vegetation, or non-stockable conditions.

Class 40—Areas 60 to 100 percent stocked with desirable trees, and with more than 30 percent of the area controlled by other trees and/or conditions that prevent occupancy by desirable trees.

Class 50—Areas less than 60 percent stocked with desirable trees, but with 100 percent or more stocking with growing-stock trees.

Class 60—Areas less than 60 percent stocked with desirable trees, but with 60 to 100 percent stocking with growing-stock trees.

Class 70—Areas less than 60 percent stocked with desirable trees, and with less than 60 percent stocking with growing-stock trees.

Table 39.—*Area of commercial forest land in Ohio, by forest types and geographic units, 1968*

(In thousands of acres)

Forest type	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
White-red pine-hemlock	8.7	6.1	29.2	10.3	—	54.3
Spruce-fir[1]	—	—	8.3	10.9	—	19.2
Virginia-pitch pine	106.2	57.0	11.7	10.7	20.4	206.0
Oak-pine	110.1	74.7	112.9	78.7	102.3	478.7
Oak-hickory	924.7	768.2	600.2	316.6	344.1	2,953.8
Oak-gum	8.5	13.2	4.3	—	—	26.0
Elm-ash-red maple	196.9	149.4	457.7	304.1	267.9	1,376.0
Maple-beech-birch	180.4	197.2	303.3	277.8	192.9	1,151.6
Aspen-birch	6.2	6.9	39.3	11.2	—	63.6
All types	1,541.7	1,272.7	1,566.9	1,020.3	927.6	6,329.2
	(Sampling errors, in percent)					
White-red pine-hemlock	(*)	(*)	37	(**)	—	30
Spruce-fir	—	—	(*)	(**)	—	(*)
Virginia-pitch pine	17	26	(*)	(**)	(*)	14
Oak-pine	17	23	21	36	30	12
Oak-hickory	4	5	7	17	15	3
Oak-gum	(*)	(*)	(**)	—	—	42
Elm-ash-red maple	12	16	8	17	17	6
Maple-beech-birch	14	13	10	18	20	7
Aspen-birch	(*)	(*)	31	(**)	—	27

* Sampling error 50 to 99 percent.

** Sampling error 100 percent or more.

[1] In Ohio this type is composed entirely of spruce plantations.

Table 40.—*Number of growing-stock trees and cull trees on commercial forest land in Ohio, by diameter-class groups, softwoods and hardwoods, and geographic units, 1968*

(In thousands of trees)

Diameter-class group (inches)	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
GROWING-STOCK TREES						
Softwoods:						
5.0- 8.9	5,705	4,450	3,431	489	572	14,647
9.0-18.9	2,285	950	782	199	—	4,216
19.0 and larger	6	1	15	—	—	22
Total	7,996	5,401	4,228	688	572	18,885
Hardwoods:						
5.0-10.9	89,092	63,425	62,521	54,780	35,720	305,538
11.0-18.9	26,898	20,175	15,040	13,702	12,411	88,226
19.0 and larger	2,160	1,903	1,752	1,738	2,746	10,299
Total	118,150	85,503	79,313	70,220	50,877	404,063
All species	126,146	90,904	83,541	70,908	51,449	422,948
CULL TREES						
Softwoods:						
5.0- 8.9	1,042	362	438	155	639	2,636
9.0-18.9	128	87	62	—	184	461
19.0 and larger	—	—	—	—	—	—
Total	1,170	449	500	155	823	3,097
Hardwoods:						
5.0-10.9	32,132	20,782	25,922	22,949	15,029	116,814
11.0-18.9	4,813	3,403	5,150	3,772	4,253	21,391
19.0 and larger	869	1,005	1,052	1,282	1,889	6,097
Total	37,814	25,190	32,124	28,003	21,171	144,302
All species	38,984	25,639	32,624	28,158	21,994	147,399

Table 41.—*Volume of timber on commercial forest land in Ohio, by class of timber and geographic units, 1968*

(In millions of cubic feet)

Class of timber	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
Sawtimber trees:						
Sawlogs	584.5	445.3	438.0	322.2	398.4	2,188.4
Upper stems	134.1	103.2	100.9	73.3	83.7	495.2
Total	718.6	548.5	538.9	395.5	482.1	2,683.6
Poletimber trees	433.8	300.7	346.3	241.4	175.1	1,497.3
All growing-stock trees	1,152.4	849.2	885.2	636.9	657.2	4,180.9
Rough trees	88.9	54.3	91.9	73.7	82.8	391.6
Rotten trees	59.8	52.2	48.3	51.2	72.2	283.7
Total, all timber	1,301.1	955.7	1,025.4	761.8	812.2	4,856.2
(Sampling errors, in percent)						
Sawtimber trees	3	3	3	8	7	2
Poletimber trees	3	4	4	10	13	3
All growing stock	2	2	3	6	6	2
Rough trees	7	8	9	13	15	5
Rotten trees	6	8	9	16	14	5

Table 42.—*Volume of growing stock on commercial forest land in Ohio, by ownership classes, softwoods and hardwoods, and geographic units, 1968*

(In millions of cubic feet)

Ownership class and species group	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
National Forest:						
Softwoods	3.6	4.2	0.3	—	—	8.1
Hardwoods	40.5	48.8	3.5	—	—	92.8
Total	44.1	53.0	3.8	—	—	100.9
Other public:						
Softwoods	7.0	1.0	2.8	—	—	10.8
Hardwoods	121.2	41.5	8.6	67.2	2.3	240.8
Total	128.2	42.5	11.4	67.2	2.3	251.6
Forest industry:						
Softwoods	1.3	3.1	—	—	—	4.4
Hardwoods	61.3	44.2	6.6	—	—	112.1
Total	62.6	47.3	6.6	—	—	116.5
Other private:						
Softwoods	42.2	19.3	25.3	4.5	1.3	92.6
Hardwoods	875.3	687.1	838.1	565.2	653.6	3,619.3
Total	917.5	706.4	863.4	569.7	654.9	3,711.9
All ownerships:						
Softwoods	54.1	27.6	28.4	4.5	1.3	115.9
Hardwoods	1,098.3	821.6	856.8	632.4	655.9	4,065.0
Total	1,152.4	849.2	885.2	636.9	657.2	4,180.9
	(Sampling errors, in percent)					
National Forest	9	9	9	—	—	9
Other public	16	22	44	(*)	(*)	28
Forest industry	23	28	(*)	—	—	18
Other private	4	4	3	7	6	2

* Sampling error 50 to 99 percent.

Table 43.—*Volume of sawtimber on commercial forest land in Ohio, by ownership classes, softwoods and hardwoods, and geographic units, 1968*

(In millions of board feet)[1]

Ownership class and species group	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
National Forest:						
Softwoods	9.7	11.6	0.8	—	—	22.1
Hardwoods	150.2	180.6	13.1	—	—	343.9
Total	159.9	192.2	13.9	—	—	366.0
Other public						
Softwoods	29.5	3.2	1.0	—	—	33.7
Hardwoods	412.8	158.4	23.8	287.6	—	882.6
Total	442.3	161.6	24.8	287.6	—	916.3
Forest industry:						
Softwoods	4.4	13.8	—	—	—	18.2
Hardwoods	233.7	150.5	23.5	—	—	407.7
Total	238.1	164.3	23.5	—	—	425.9
Other private:						
Softwoods	145.0	51.2	68.0	11.3	—	275.5
Hardwoods	2,828.6	2,383.6	2,902.9	1,884.6	2,568.2	12,567.9
Total	2,973.6	2,434.8	2,970.9	1,895.9	2,568.2	12,843.4
All ownerships:						
Softwoods	188.6	79.8	69.8	11.3	—	349.5
Hardwoods	3,625.3	2,873.1	2,963.3	2,172.2	2,568.2	14,202.1
Total	3,813.9	2,952.9	3,033.1	2,183.5	2,568.2	14,551.6
	(Sampling errors, in percent)					
National Forest	11	11	11	—	—	11
Other public	17	23	(*)	(*)	—	31
Forest industry	26	30	(*)	—	—	19
Other private	3	5	3	8	7	2

* Sampling error 50 to 99 percent.

[1] International ¼-inch rule.

Table 44.—*Volume of growing stock on commercial forest land in Ohio, by stand-size classes, softwoods and hardwoods, and geographic units, 1968*

(In millions of cubic feet)

Stand-size class and species group	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
Sawtimber stands:						
Softwoods	19.9	7.3	12.7	0.5	—	40.4
Hardwoods	609.5	477.6	429.5	401.5	469.0	2,387.1
Total	629.4	484.9	442.2	402.0	469.0	2,427.5
Poletimber stands:						
Softwoods	19.0	10.7	12.2	4.0	—	45.9
Hardwoods	198.6	119.4	150.9	89.7	39.0	597.6
Total	217.6	130.1	163.1	93.7	39.0	643.5
Other stands:						
Softwoods	15.2	9.6	3.5	—	1.3	29.6
Hardwoods	290.2	224.6	276.4	141.2	147.9	1,080.3
Total	305.4	234.2	279.9	141.2	149.2	1,109.9
All stands:						
Softwoods	54.1	27.6	28.4	4.5	1.3	115.9
Hardwoods	1,098.3	821.6	856.8	632.4	655.9	4,065.0
Total	1,152.4	849.2	885.2	636.9	657.2	4,180.9
	(Sampling errors, in percent)					
Sawtimber stands	5	5	7	11	7	3
Poletimber stands	11	14	13	32	28	8
Other stands	7	8	8	18	13	5
All stands:						
Softwoods	16	22	40	(*)	(*)	14
Hardwoods	2	2	3	6	4	2
Total	2	2	3	6	4	2

* Sampling error 50 to 99 percent.

Table 45.—*Volume of sawtimber on commercial forest land in Ohio, by stand-size classes, softwoods and hardwoods, and geographic units, 1968*

(In millions of board feet)[1]

Stand-size class and species group	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
Sawtimber stands:						
Softwoods	87.2	29.7	51.1	—	—	168.0
Hardwoods	2,383.6	1,938.1	1,789.1	1,670.5	2,099.8	9,881.1
Total	2,470.8	1,967.8	1,840.2	1,670.5	2,099.8	10,049.1
Poletimber stands:						
Softwoods	51.9	25.1	4.3	11.3	—	92.6
Hardwoods	427.3	255.5	344.0	181.3	61.8	1,269.9
Total	479.2	280.6	348.3	192.6	61.8	1,362.5
Other stands:						
Softwoods	49.5	25.0	14.4	—	—	88.9
Hardwoods	814.4	679.5	830.2	320.4	406.6	3,051.1
Total	863.9	704.5	844.6	320.4	406.6	3,140.0
All stands:						
Softwoods	188.6	79.8	69.8	11.3	—	349.5
Hardwoods	3,625.3	2,873.1	2,963.3	2,172.2	2,568.2	14,202.1
Total	3,813.9	2,952.9	3,033.1	2,183.5	2,568.2	14,551.6
(Sampling errors, in percent)						
Sawtimber stands	5	5	6	10	8	3
Poletimber stands	13	16	16	40	(*)	9
Other stands	9	10	10	25	22	6
All stands:						
Softwoods	17	23	(*)	(**)	—	15
Hardwoods	3	3	3	7	7	2
Total	3	3	3	7	7	1

[1] International ¼-inch rule.
* Sampling error 50 to 99 percent.
** Sampling error 100 percent or more.

Table 46.—*Net volume of growing stock on commercial forest land in the SOUTH-CENTRAL UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	1.1	0.9	0.2	—	—	—	—	—	—	—	—
Virginia pine	35.4	3.9	10.0	9.2	7.2	4.1	0.5	0.5	—	—	—
Other yellow pines	14.9	1.2	2.9	3.9	1.8	1.9	1.8	1.1	0.2	0.1	—
Other softwoods	2.7	.5	.8	.5	—	.4	—	.2	—	—	0.3
Total softwoods	54.1	6.5	13.9	13.6	9.0	6.4	2.3	1.8	.2	.1	.3
Select white oaks	192.3	11.0	18.0	30.2	34.9	29.2	27.7	15.6	8.6	15.0	2.1
Select red oaks	72.0	2.6	5.9	8.2	11.5	11.1	10.4	6.3	5.3	9.8	.9
Chestnut oak[1]	151.2	9.3	18.6	28.1	26.2	26.3	17.5	11.7	7.1	5.7	.7
Other red oaks	152.0	3.7	13.4	23.6	23.8	27.0	21.0	19.8	8.6	10.8	.3
Hickory species	135.5	12.6	24.8	29.3	27.9	19.2	10.4	5.9	2.8	2.6	—
Hard maple	51.7	7.8	10.8	8.9	7.4	5.3	5.3	2.2	2.4	1.3	.3
Soft maple	28.6	4.9	5.2	4.4	4.8	4.7	1.6	.4	.5	1.5	.6
Beech	15.8	.8	.8	1.1	2.0	2.2	1.8	1.2	2.7	2.3	.9
Ash species	57.1	5.3	6.7	10.6	10.7	9.6	6.3	3.4	1.8	2.7	—
Aspen and cottonwood	5.9	.8	1.6	.8	1.0	.4	—	—	.3	1.0	—
Basswood	6.5	.3	.4	1.3	1.1	1.3	.8	.7	.2	.4	—
Yellow-poplar	74.7	3.8	7.3	9.9	11.8	11.1	11.8	9.3	3.6	5.1	1.0
Black walnut	22.6	1.9	4.5	4.2	3.7	2.9	2.3	1.2	.9	1.0	—
Black cherry	13.4	.6	2.2	3.7	1.7	3.1	1.3	.1	.2	.5	—
Sycamore	24.9	1.8	1.5	2.7	3.2	3.6	2.6	2.8	1.2	3.7	1.8
Black locust	11.3	3.1	2.7	3.8	.7	.4	.2	.2	.2	—	—
Elm	27.1	4.3	4.9	6.5	2.9	4.7	2.3	1.0	—	.5	—
Sassafras	15.9	5.1	6.2	2.1	1.7	.8	—	—	—	—	—
Other hardwoods	39.8	4.6	7.0	7.2	4.7	6.1	5.2	3.6	.7	.7	—
Total hardwoods	1,098.3	84.3	142.5	186.6	181.7	169.0	128.5	85.4	47.1	64.6	8.6
All species	1,152.4	90.8	156.4	200.2	190.7	175.4	130.8	87.2	47.3	64.7	8.9

[1] Includes a small volume of other white oaks.

Table 47.—*Net volume of growing-stock on commercial forest land in the SOUTHEASTERN UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	6.3	2.7	1.7	0.5	0.5	0.6	0.3	—	—	—	—
Virginia pine	14.7	1.9	3.8	3.9	3.2	1.4	—	0.5	—	—	—
Other yellow pines	4.9	.5	1.2	.3	1.7	.7	—	.4	—	0.1	—
Other softwoods	1.7	1.2	.3	—	—	.2	—	—	—	—	—
Total softwoods	27.6	6.3	7.0	4.7	5.4	2.9	0.3	0.9	—	0.1	—
Select white oaks	154.1	6.9	12.0	25.3	30.0	30.8	17.5	15.1	4.6	7.7	4.2
Select red oaks	65.4	1.9	3.8	9.1	8.5	7.5	8.6	7.5	6.4	10.6	1.5
Chestnut oak[1]	72.8	4.2	10.2	11.3	16.8	9.9	9.1	3.0	3.1	5.2	—
Other red oaks	120.7	3.3	7.4	13.9	18.5	17.8	16.1	18.3	8.5	14.9	2.0
Hickory species	87.9	9.3	18.3	16.4	18.9	10.5	9.1	4.4	.5	.5	—
Hard maple	37.2	5.0	6.2	6.6	7.3	4.0	3.0	2.3	2.0	.6	.2
Soft maple	20.1	3.2	4.8	4.5	2.4	2.0	1.4	1.6	—	.2	—
Beech	23.6	1.1	1.8	2.3	3.2	2.9	4.6	1.2	1.2	4.5	.8
Ash species	28.6	3.9	3.6	5.0	5.9	2.3	3.8	1.8	1.5	.5	.3
Aspen and cottonwood	9.6	2.6	3.0	1.2	1.1	1.4	—	—	—	.3	—
Basswood	5.1	.2	.6	.8	.8	.6	.6	.9	.6	—	—
Yellow-poplar	86.4	5.5	9.8	13.3	9.6	15.3	12.7	6.0	5.9	7.4	.9
Black walnut	18.8	1.7	2.9	2.6	3.1	3.3	2.5	1.1	1.3	.3	—
Black cherry	10.1	.6	2.1	2.0	1.6	2.2	1.0	.3	—	.3	—
Sycamore	17.2	1.2	1.4	1.8	1.9	1.4	2.0	1.4	.7	3.5	1.9
Black locust	5.4	.6	1.2	1.5	1.4	.7	—	—	—	—	—
Elm	31.0	3.6	6.3	5.9	4.7	3.6	1.6	2.0	2.3	.8	.2
Sassafras	4.1	1.3	1.2	.5	.3	.8	—	—	—	—	—
Other hardwoods	23.5	3.0	5.3	2.4	4.9	2.4	1.6	1.7	1.1	.8	.3
Total hardswoods	821.6	59.1	101.9	126.4	140.9	119.4	95.2	68.6	39.7	58.1	12.3
All species	849.2	65.4	108.9	131.1	146.3	122.3	95.5	69.5	39.7	58.2	12.3

[1] Includes a small volume of other white oaks.

Table 48.—*Net volume of growing stock on commercial forest land in the EAST-CENTRAL UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	18.3	3.7	7.5	3.6	2.4	0.6	0.3	—	—	0.2	—
Virginia pine	.4	—	.3	.1	—	—	—	—	—	—	—
Other yellow pines	4.0	2.6	1.1	.3	—	—	—	—	—	—	—
Other softwoods	5.7	.5	.5	2.0	1.1	.3	.3	.3	—	.7	—
Total softwoods	28.4	6.8	9.4	6.0	3.5	.9	.6	.3	—	.9	—
Select white oaks	97.9	5.3	10.5	12.2	12.4	15.0	11.8	8.9	5.8	12.1	3.9
Select red oaks	60.0	2.7	6.5	7.9	6.9	4.1	4.3	6.2	3.6	13.6	4.2
Chestnut oak[1]	21.0	.9	1.2	3.1	3.1	1.8	3.2	2.9	1.9	2.9	—
Other red oaks	84.3	3.3	7.6	11.9	14.1	11.3	10.8	8.0	6.8	8.0	2.5
Hickory species	80.7	7.3	12.5	12.0	14.7	13.2	8.6	4.6	4.3	3.5	—
Hard maple	35.6	5.1	5.8	6.4	3.5	5.6	4.2	2.1	1.2	.9	.8
Soft maple	42.1	6.8	7.9	6.7	7.5	6.2	3.3	1.7	.8	1.2	—
Beech	37.3	1.4	2.8	2.5	3.8	4.9	4.3	3.7	5.7	6.0	2.2
Ash species	41.4	3.6	4.1	7.3	7.8	5.5	4.4	2.6	3.2	2.7	.2
Aspen and cottonwood	20.4	5.1	5.5	2.7	3.2	3.2	.5	.2	—	—	—
Basswood	6.0	.3	.3	.4	.4	1.5	.5	.4	1.7	.5	—
Yellow-poplar	88.9	6.5	10.0	11.9	15.9	13.6	12.0	6.3	3.9	8.0	.8
Black walnut	27.0	4.0	4.7	5.6	6.0	1.7	3.2	.8	.4	.6	—
Black cherry	51.9	6.8	10.9	10.4	11.7	5.9	3.4	1.0	1.3	.5	—
Sycamore	9.6	.1	1.0	.2	.3	1.6	1.2	2.2	.6	1.3	1.1
Black locust	22.3	5.2	5.8	5.6	1.3	2.1	1.1	.9	.3	—	—
Elm	101.8	11.0	16.5	20.7	15.8	13.9	9.9	3.7	3.1	5.7	1.5
Sassafras	7.1	2.8	2.3	1.0	.5	.3	.2	—	—	—	—
Other hardwoods	21.5	1.5	2.9	3.1	3.7	3.6	3.2	2.1	—	1.4	—
Total hardwoods	856.8	79.7	118.8	131.6	132.6	115.0	90.1	58.3	44.6	68.9	17.2
All species	885.2	86.5	128.2	137.6	136.1	115.9	90.7	58.6	44.6	69.8	17.2

[1] Includes a small volume of other white oaks.

Table 49.—*Net volume of growing stock on commercial forest land in the NORTHEASTERN UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
Other softwoods	4.5	0.5	1.8	1.4	0.8	—	—	—	—	—	—
Total softwoods	4.5	0.5	1.8	1.4	0.8	—	—	—	—	—	—
Select white oaks	61.3	2.4	6.9	3.9	6.9	12.2	5.0	3.1	5.3	9.9	5.7
Select red oaks	63.9	5.5	6.8	6.0	6.0	6.6	4.7	8.7	.8	12.9	5.9
Other red oaks	51.3	1.8	6.1	6.9	5.4	3.1	2.6	4.4	1.6	12.6	6.8
Hickory species	78.3	7.9	16.3	13.2	17.6	10.7	5.1	3.3	2.4	1.8	—
Hard maple	47.9	5.0	6.2	4.5	7.2	7.3	5.0	3.6	.7	6.6	1.8
Soft maple	73.0	8.0	11.8	12.3	4.1	11.0	5.0	7.0	5.2	7.8	.8
Beech	39.8	5.2	4.2	6.3	6.1	2.0	6.0	3.2	3.0	3.8	—
Ash species	63.8	5.8	10.0	9.3	12.9	10.6	6.7	2.5	1.6	4.4	—
Aspen and cottonwood	7.4	3.3	2.8	1.3	—	—	—	—	—	—	—
Basswood	6.4	—	.6	1.4	1.4	1.5	1.5	—	—	—	—
Yellow-poplar	11.8	.5	—	.7	2.7	4.3	.8	.6	.6	1.6	—
Black walnut	10.0	1.8	.8	2.1	.8	1.6	2.0	—	.9	—	—
Black cherry	32.3	4.6	7.7	7.2	3.1	4.8	2.5	1.6	.8	—	—
Sycamore	2.2	—	—	.7	.6	—	—	—	—	.9	—
Black locust	1.7	.4	1.3	—	—	—	—	—	—	—	—
Elm	73.3	6.6	7.9	8.4	12.4	8.5	12.4	6.4	1.7	2.5	6.5
Sassafras	3.3	.9	1.1	—	.6	—	—	.7	—	—	—
Other hardwoods	4.7	1.0	1.8	1.9	—	—	—	—	—	—	—
Total hardwoods	632.4	60.7	92.3	86.1	87.8	84.2	59.3	45.1	24.6	64.8	27.5
All species	636.9	61.2	94.1	87.5	88.6	84.2	59.3	45.1	24.6	64.8	27.5

Table 50.—*Net volume of growing stock on commercial forest land in the WESTERN UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	0.4	0.4	—	—	—	—	—	—	—	—	—
Virginia pine	.5	.5	—	—	—	—	—	—	—	—	—
Other softwoods	.4	.4	—	—	—	—	—	—	—	—	—
Total softwoods	1.3	1.3	—	—	—	—	—	—	—	—	—
Select white oaks	87.4	3.4	3.8	2.7	5.9	8.5	11.2	10.6	6.9	27.3	7.1
Select red oaks	51.6	1.2	5.9	3.3	3.4	3.8	3.7	5.3	5.5	18.6	.9
Chestnut oak[1]	7.0	—	—	.6	1.5	—	3.3	.7	—	.9	—
Other red oaks	23.9	.6	—	—	1.7	2.5	5.5	1.0	5.3	6.4	.9
Hickory species	100.1	13.2	20.9	16.7	7.0	9.5	11.0	9.2	7.6	5.0	—
Hard maple	67.5	2.4	8.1	7.1	11.6	14.2	6.9	6.3	3.2	7.7	—
Soft maple	63.6	3.0	5.6	12.6	5.7	4.0	7.4	8.6	2.2	8.0	6.5
Beech	33.6	—	1.2	.8	5.3	3.6	.9	5.1	4.0	11.9	.8
Ash species	78.5	7.7	7.2	8.7	9.3	11.4	11.1	8.3	8.8	6.0	—
Aspen and cottonwood	11.7	1.4	1.2	.8	.7	.9	2.7	.7	—	—	3.3
Basswood	23.3	1.0	—	4.5	3.9	2.4	4.1	3.2	—	1.8	2.4
Yellow-poplar	4.0	—	.7	—	—	1.6	.8	—	—	.9	—
Black walnut	20.4	1.9	1.7	4.1	3.3	2.1	3.9	1.8	.9	.7	—
Black cherry	14.4	2.7	3.3	—	3.3	.9	2.6	.7	—	.9	—
Sycamore	24.1	—	.6	—	—	.8	5.9	1.8	4.5	1.7	8.8
Black locust	4.9	1.2	.6	—	.6	.8	—	1.7	—	—	—
Elm	10.7	1.3	3.5	1.4	.8	.9	.9	1.9	—	—	—
Other hardwoods	29.2	.8	3.0	1.4	4.5	3.2	2.4	5.2	3.7	2.9	2.1
Total hardwoods	655.9	41.8	67.3	64.7	68.5	71.1	84.3	72.1	52.6	100.7	32.8
All species	657.2	43.1	67.3	64.7	68.5	71.1	84.3	72.1	52.6	100.7	32.8

[1] Includes a small volume of other white oaks.

Table 51.—*Net volume of sawtimber on commercial forest land in the SOUTH-CENTRAL Unit, in Ohio, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	—	—	—	—	—	—	—	—	—
Virginia pine	117.8	46.7	40.4	24.5	3.1	3.1	—	—	—
Other yellow pines	61.4	19.3	10.7	11.2	11.4	6.8	1.6	0.4	—
Other softwoods	9.4	3.5	—	2.6	—	1.4	—	—	1.9
Total softwoods	188.6	69.5	51.1	38.3	14.5	11.3	1.6	0.4	1.9
Select white oaks	698.8	—	182.7	155.9	146.9	79.6	45.2	77.9	10.6
Select red oaks	294.8	—	56.7	59.6	54.3	34.0	29.6	55.4	5.2
Chestnut oak[2]	485.8	—	130.0	133.3	91.2	59.6	37.3	30.6	3.8
Other red oaks	588.1	—	116.0	145.4	110.6	105.2	47.9	60.9	2.1
Hickory species	337.7	—	133.4	95.1	52.0	29.5	14.4	13.3	—
Hard maple	143.5	—	42.7	31.5	31.6	13.2	14.6	8.5	1.4
Soft maple	85.5	—	28.7	28.3	9.7	2.4	2.7	9.9	3.8
Beech	85.7	—	12.3	14.9	11.5	7.5	18.5	15.0	6.0
Ash species	170.8	—	53.1	47.5	31.4	16.4	9.2	13.2	—
Aspen and cottonwood	13.8	—	5.2	2.1	—	—	1.3	5.2	—
Basswood	24.5	—	5.7	7.4	4.4	3.7	1.0	2.3	—
Yellow-poplar	311.6	—	66.2	64.9	68.6	54.4	21.5	30.5	5.5
Black walnut	62.3	—	18.5	15.5	12.7	6.2	4.4	5.0	—
Black cherry	35.0	—	8.2	15.8	6.5	.6	1.3	2.6	—
Sycamore	98.4	—	17.4	19.1	13.2	14.0	6.4	19.2	9.1
Black locust	9.3	—	3.3	2.2	1.2	1.3	1.3	—	—
Elm	59.0	—	15.2	24.4	11.8	5.2	—	2.4	—
Sassafras	13.6	—	9.2	4.4	—	—	—	—	—
Other hardwoods	107.1	—	23.8	31.7	26.4	18.0	3.7	3.5	—
Total hardwoods	3,625.3	—	928.3	899.0	684.0	450.8	260.3	355.4	47.5
All species	3,813.9	69.5	979.4	937.3	698.5	462.1	261.9	355.8	49.4

[1] International ¼-inch rule.
[2] Includes a small volume of other white oaks.

Table 52.—*Net volume of sawtimber on commercial forest land in the SOUTHEASTERN UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	10.6	2.5	3.0	3.3	1.8	—	—	—	—
Virginia pine	49.3	20.0	17.2	8.4	—	3.7	—	—	—
Other yellow pines	18.5	1.0	9.6	4.7	.4	2.3	—	0.5	—
Other softwoods	1.4	—	—	1.4	—	—	—	—	—
Total softwoods	79.8	23.5	29.8	17.8	2.2	6.0	—	0.5	—
Select white oaks	579.9	—	157.7	165.5	93.1	78.5	23.7	40.7	20.7
Select red oaks	270.8	—	40.7	39.2	44.6	41.1	36.3	60.1	8.8
Chestnut oak[2]	241.4	—	82.5	52.3	47.5	15.7	16.3	27.1	—
Other red oaks	508.7	—	89.3	93.3	84.9	98.7	48.0	84.1	10.4
Hickory species	214.1	—	89.4	51.5	46.4	21.5	2.6	2.7	—
Hard maple	115.0	—	42.7	24.3	17.6	13.9	12.0	3.3	1.2
Soft maple	46.1	—	14.2	12.0	8.2	10.0	.4	1.3	—
Beech	121.3	—	22.0	19.3	30.4	7.8	7.3	29.8	4.7
Ash species	80.7	—	29.3	11.8	19.4	8.3	7.9	2.6	1.4
Aspen and cottonwood	14.4	—	5.3	7.4	—	—	—	1.7	—
Basswood	19.1	—	3.6	3.3	3.7	5.0	3.5	—	—
Yellow-poplar	338.1	—	53.3	88.4	74.9	35.6	34.8	45.2	5.9
Black walnut	68.7	—	18.6	21.8	14.7	5.4	6.8	1.4	—
Black cherry	28.1	—	7.6	11.3	5.7	2.0	—	1.5	—
Sycamore	66.4	—	9.6	7.6	10.8	7.0	3.8	18.1	9.5
Black locust	10.5	—	7.0	3.5	—	—	—	—	—
Elm	78.8	—	23.8	19.5	7.9	10.2	12.0	4.2	1.2
Sassafras	5.2	—	1.2	4.0	—	—	—	—	—
Other hardwoods	65.8	—	24.5	12.8	8.1	8.7	5.8	4.5	1.4
Total hardwoods	2,873.1	—	722.3	648.8	517.9	369.4	221.2	328.3	65.2
All species	2,952.9	23.5	752.1	666.6	520.1	375.4	221.2	328.8	65.2

[1] International ¼-inch rule.
[1] Includes a small volume of other white oaks.

Table 53.—*Net volume of sawtimber on commercial forest land in the EAST-CENTRAL UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0 14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White and red pine	40.8	19.4	14.2	3.8	2.0	—	—	1.4	—
Virginia pine	.6	.3	.2	.1	—	—	—	—	—
Other yellow pines	1.6	1.5	—	—	—	0.1	—	—	—
Other softwoods	26.8	10.5	6.7	1.8	1.5	2.1	—	4.2	—
Total softwoods	69.8	31.7	21.1	5.7	3.5	2.2	—	5.6	—
Select white oaks	382.7	—	69.1	84.7	63.7	48.1	32.0	65.1	20.0
Select red oaks	238.6	—	35.4	21.7	24.1	33.2	20.3	79.9	24.0
Chestnut oak[2]	84.2	—	15.9	9.9	16.5	15.0	10.7	16.2	—
Other red oaks	337.0	—	72.4	61.4	59.0	44.0	38.8	47.2	14.2
Hickory species	252.9	—	74.5	68.1	43.9	24.1	22.9	19.4	—
Hard maple	115.3	—	21.8	35.3	26.7	12.9	7.8	6.0	4.8
Soft maple	130.6	—	46.3	39.4	20.9	10.9	5.4	7.7	—
Beech	210.5	—	24.8	34.3	30.2	25.5	39.8	40.9	15.0
Ash species	137.7	—	41.3	28.0	22.8	13.3	17.0	14.1	1.2
Aspen and cottonwood	38.2	—	16.9	17.1	2.9	1.3	—	—	—
Basswood	29.1	—	2.0	8.3	3.2	2.6	9.8	3.2	—
Yellow-poplar	367.8	—	93.9	83.1	72.8	38.6	24.9	49.5	5.0
Black walnut	69.4	—	33.3	8.9	17.8	4.5	1.9	3.0	—
Black cherry	124.5	—	58.7	31.1	18.4	5.5	7.8	3.0	—
Sycamore	45.4	—	1.6	8.8	6.7	12.4	3.0	7.2	5.7
Black locust	31.3	—	7.1	12.1	5.9	4.6	1.6	—	—
Elm	288.1	—	85.4	75.1	53.0	19.2	17.1	30.6	7.7
Sassafras	5.2	—	2.5	1.5	1.2	—	—	—	—
Other hardwoods	74.8	—	18.9	19.3	17.5	11.2	—	7.9	—
Total hardwoods	2,963.3	—	721.8	648.1	507.2	326.9	260.8	400.9	97.6
All species	3,033.1	31.7	742.9	653.8	510.7	329.1	260.8	406.5	97.6

[1] International ¼-inch rule.
[2] Includes a small volume of other white oaks.

Table 54.—*Net volume of sawtimber on commercial forest land in the NORTHEASTERN UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
Other softwoods	11.3	6.9	4.4	—	—	—	—	—	—
Total softwoods	11.3	6.9	4.4	—	—	—	—	—	—
Select white oaks	273.5	—	39.7	73.3	29.7	18.2	30.5	53.4	28.7
Select red oaks	231.9	—	29.7	36.6	24.3	45.1	4.6	63.2	28.4
Other red oaks	183.7	—	27.5	18.0	13.6	22.7	8.4	61.6	31.9
Hickory species	201.6	—	84.4	53.1	26.4	16.7	12.1	8.9	—
Hard maple	174.2	—	38.0	40.7	27.9	20.1	3.7	34.7	9.1
Soft maple	263.5	—	25.3	70.8	31.9	45.9	34.1	50.4	5.1
Beech	160.7	—	41.1	13.4	41.1	21.1	19.7	24.3	—
Ash species	196.4	—	64.8	53.9	34.4	13.1	8.3	21.9	—
Basswood	23.0	—	7.5	7.6	7.9	—	—	—	—
Yellow-poplar	63.3	—	15.4	26.2	4.9	3.6	4.0	9.2	—
Black walnut	26.6	—	3.9	8.8	9.2	—	4.7	—	—
Black cherry	67.4	—	15.5	25.5	13.7	8.4	4.3	—	—
Sycamore	8.5	—	3.8	—	—	—	—	4.7	—
Elm	289.9	—	72.8	50.0	73.3	37.3	9.8	13.5	33.2
Sassafras	8.0	—	3.9	—	—	4.1	—	—	—
Total hardwoods	2,172.5	—	473.3	477.9	338.3	256.3	144.2	345.8	136.4
All species	2,183.5	6.9	477.7	477.9	338.3	256.3	144.2	345.8	136.4

[1] International ¼-inch rule.

Table 55.—*Net volume of sawtimber on commercial forest land in the WESTERN UNIT, in Ohio, by species and diameter classes, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)						
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
Select white oaks	424.7	—	33.3	48.6	63.8	58.5	39.4	145.4	35.7
Select red oaks	203.5	—	15.9	20.8	19.1	26.7	27.1	90.0	3.9
Chestnut oak[2]	35.0	—	8.2	—	18.4	3.8	—	4.6	—
Other red oaks	117.5	—	8.1	13.5	28.2	5.1	27.3	31.3	4.0
Hickory species	238.8	—	32.3	45.2	53.2	45.2	38.2	24.7	—
Hard maple	262.3	—	59.0	75.4	37.3	33.2	17.5	39.9	—
Soft maple	256.7	—	33.4	24.0	45.4	53.5	13.8	49.3	37.3
Beech	199.2	—	34.1	24.4	5.9	32.2	25.5	72.2	4.9
Ash species	272.1	—	44.7	56.8	56.2	41.4	44.4	28.6	—
Aspen and cottonwood	42.4	—	3.8	4.5	14.6	3.8	—	—	15.7
Basswood	88.0	—	19.6	12.4	21.1	16.2	—	8.2	10.5
Yellow-poplar	18.3	—	—	8.7	4.9	—	—	4.7	—
Black walnut	73.0	—	18.2	12.3	24.5	9.1	4.6	4.3	—
Black cherry	42.7	—	16.9	4.3	13.3	3.9	—	4.3	—
Sycamore	123.9	—	—	4.4	33.2	9.9	25.2	9.1	42.1
Black locust	18.3	—	3.9	4.3	—	10.1	—	—	—
Elm	24.7	—	4.1	5.1	4.7	10.8	—	—	—
Other hardwoods	127.1	—	24.8	17.8	13.4	28.2	19.0	14.5	9.4
Total hardwoods	2,568.2	—	360.3	382.5	457.2	391.6	282.0	531.1	163.5
All species	2,568.2	—	360.3	382.5	457.2	391.6	282.0	531.1	163.5

[1] International ¼-inch rule.

[2] Includes a small volume of other white oaks.

Table 56.—*Net volume of sawtimber on commercial forest land in the SOUTH-CENTRAL UNIT, in Ohio, by species and log quality classes, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			Other logs[2]
		Grade 1	Grade 2	Grade 3	
White and red pine	—	—	—	—	—
Virginia pine	117.8	1.3	6.1	81.4	29.0
Other yellow pines	61.4	1.6	10.8	33.6	15.4
Other softwoods	9.4	—	—	—	—
Total softwoods	188.6	2.9	16.9	115.0	44.4
Select white oaks	698.8	70.5	172.3	363.1	92.9
Select red oaks	294.8	55.4	77.6	129.0	32.8
Chestnut oak[3]	485.8	60.0	115.5	233.5	76.8
Other red oaks	588.1	84.1	105.6	304.2	94.2
Hickory species	337.7	23.5	44.8	171.6	97.8
Hard maple	143.5	11.3	22.7	84.3	25.2
Soft maple	85.5	3.5	8.6	48.7	24.7
Beech	85.7	1.3	7.9	51.9	24.6
Ash species	170.8	18.9	39.0	77.4	35.5
Aspen and cottonwood	13.8	3.4	1.9	7.4	1.1
Basswood	24.5	1.9	7.1	12.7	2.8
Yellow-poplar	311.6	69.9	71.4	120.5	49.8
Black walnut	62.3	6.0	13.8	36.9	5.6
Black cherry	35.0	3.1	4.0	19.8	8.1
Sycamore	98.4	14.5	22.7	47.1	14.1
Black locust	9.3	—	.8	6.5	2.0
Elm	59.0	3.2	12.8	35.0	8.0
Sassafras	13.6	—	1.5	9.9	2.2
Other hardwoods	107.1	8.8	23.4	56.0	18.9
Total hardwoods	3,625.3	439.3	753.4	1,815.5	617.1

[1] International ¼-inch rule.

[2] For white, red, and yellow pines "Other" is grade 4. For hardwoods "Other" is tie and timber logs. Other softwoods were not graded into standard-lumber grades.

[3] Includes a small volume of other white oaks.

Table 57.—*Net volume of sawtimber on commercial forest land in the SOUTHEASTERN UNIT, in Ohio, by species and log quality classes, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			Other logs[2]
		Grade 1	Grade 2	Grade 3	
White and red pine	10.6	—	—	7.9	2.7
Virginia pine	49.3	—	1.2	37.1	11.0
Other yellow pines	18.5	1.0	4.3	9.0	4.2
Other softwoods	1.4	—	—	—	—
Total softwoods	79.8	1.0	5.5	54.0	17.9
Select white oaks	579.9	44.7	156.1	278.6	100.5
Select red oaks	270.8	64.9	71.8	96.3	37.8
Chestnut oak[3]	241.4	22.6	64.4	114.2	40.2
Other red oaks	508.7	93.1	106.8	216.4	92.4
Hickory species	214.1	7.9	31.5	104.4	70.3
Hard maple	115.0	9.6	16.6	63.7	25.1
Soft maple	46.1	1.4	12.4	25.0	7.3
Beech	121.3	1.3	9.6	55.3	55.1
Ash species	80.7	9.1	20.1	34.2	17.3
Aspen and cottonwood	14.4	—	2.7	8.5	3.2
Basswood	19.1	1.2	4.6	11.0	2.3
Yellow-poplar	338.1	81.5	82.8	122.9	50.9
Black walnut	68.7	3.4	16.0	42.2	7.1
Black cherry	28.1	2.7	5.2	14.2	6.0
Sycamore	66.4	14.1	20.5	23.7	8.1
Black locust	10.5	—	—	7.7	2.8
Elm	78.8	4.8	17.2	35.4	21.4
Sassafras	5.2	—	—	4.7	.5
Other hardwoods	65.8	7.8	14.0	31.7	12.3
Total hardwoods	2,873.1	370.1	652.3	1,290.1	560.6

[1] International ¼-inch rule.

[2] For white, red, and yellow pines "Other" is grade 4. For hardwoods "Other" is tie and timber logs. Other softwoods were not graded into standard-lumber grades.

[3] Includes a small volume of other white oaks.

Table 58.—*Net volume of sawtimber on commercial forest land in the EAST-CENTRAL UNIT, in Ohio, by species and log quality classes, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			Other logs[2]
		Grade 1	Grade 2	Grade 3	
White and red pine	40.8	—	—	26.3	14.5
Virginia pine	.6	—	—	.4	.2
Other yellow pines	1.6	—	—	1.5	.1
Other softwoods	26.8	—	—	—	—
Total softwoods	69.8	—	—	28.2	14.8
Select white oaks	382.7	46.1	95.6	187.0	54.0
Select red oaks	238.6	51.0	53.6	104.2	29.8
Chestnut oak[3]	84.2	7.7	28.4	36.4	11.7
Other red oaks	337.0	28.3	63.9	189.1	55.7
Hickory species	252.9	18.0	38.8	98.6	97.5
Hard maple	115.3	10.1	26.3	56.3	22.6
Soft maple	130.6	4.7	13.3	81.0	31.6
Beech	210.5	4.7	36.7	118.5	50.6
Ash species	137.7	12.8	30.4	62.8	31.7
Aspen and cottonwood	38.2	—	5.4	23.5	9.3
Basswood	29.1	2.5	10.3	14.3	2.0
Yellow-poplar	367.8	58.6	59.5	156.2	93.5
Black walnut	69.4	3.4	8.3	45.2	12.5
Black cherry	124.5	3.5	5.5	72.7	42.8
Sycamore	45.4	14.0	10.7	17.4	3.3
Black locust	31.3	—	2.3	24.6	4.4
Elm	288.1	18.2	44.9	174.3	50.7
Sassafras	5.2	.7	.2	3.8	.5
Other hardwoods	74.8	8.1	16.6	39.1	11.0
Total hardwoods	2,963.3	292.4	550.7	1,505.0	615.2

[1] International ¼-inch rule.

[2] For white, red, and yellow pines "Other" is grade 4. For hardwoods "Other" is tie and timber logs. Other softwoods were not graded into standard-lumber grades.

[3] Includes a small volume of other white oaks.

Table 59.—*Net volume of sawtimber on commercial forest land in the NORTHEASTERN UNIT, in Ohio, by species and log quality classes, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			Other logs[2]
		Grade 1	Grade 2	Grade 3	
Other softwoods	11.3	—	—	—	—
Total softwoods	11.3	—	—	—	—
Select white oaks	273.5	23.6	67.8	112.9	69.2
Select red oaks	231.9	47.9	51.9	108.2	23.9
Other red oaks	183.7	53.0	32.6	43.7	54.4
Hickory species	201.6	4.8	24.9	113.9	58.0
Hard maple	174.2	16.1	31.9	99.4	26.8
Soft maple	263.5	31.0	57.1	133.3	42.1
Beech	160.7	3.9	21.1	87.4	48.3
Ash species	196.4	13.5	43.8	91.0	48.1
Basswood	23.0	4.0	1.8	15.4	1.8
Yellow-poplar	63.3	6.4	11.5	32.9	12.5
Black walnut	26.6	2.9	10.0	11.4	2.3
Black cherry	67.4	5.2	11.9	34.9	15.4
Sycamore	8.5	—	—	7.7	.8
Elm	289.9	24.0	72.5	152.8	40.6
Sassafras	8.0	—	2.7	4.5	.8
Total hardwoods	2,172.2	236.3	441.5	1,049.4	445.0

[1] International ¼-inch rule.

[2] For white, red, and yellow pines "Other" is grade 4. For hardwoods "Other" is tie and timber logs. Other softwoods were not graded into standard-lumber grades.

Table 60.—*Net volume of sawtimber on commercial forest land in the WESTERN UNIT, in Ohio, by species and log quality classes, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			Other logs[2]
		Grade 1	Grade 2	Grade 3	
Select white oaks	424.7	76.1	103.8	192.2	52.6
Select red oaks	203.5	69.5	44.4	70.9	18.7
Chestnut oak[3]	35.0	6.0	13.2	12.6	3.2
Other red oaks	117.5	14.9	10.6	39.3	52.7
Hickory species	238.8	33.0	54.6	97.7	53.5
Hard maple	262.3	19.5	59.1	150.8	32.9
Soft maple	256.7	7.1	70.8	126.0	52.8
Beech	199.2	13.1	48.9	102.7	34.5
Ash species	272.1	79.7	61.1	103.0	28.3
Aspen and cottonwood	42.4	10.1	7.0	6.8	18.5
Basswood	88.0	5.3	16.0	60.1	6.6
Yellow-poplar	18.3	—	3.2	9.0	6.1
Black walnut	73.0	13.1	14.7	39.1	6.1
Black cherry	42.7	7.9	5.0	22.9	6.9
Sycamore	123.9	49.5	29.9	36.2	8.3
Black locust	18.3	3.2	4.4	9.2	1.5
Elm	24.7	3.6	4.5	14.5	2.1
Sassafras	—	—	—	—	—
Other hardwoods	127.1	22.7	24.2	65.9	14.3
Total hardwoods	2,568.2	434.3	575.4	1,158.9	399.6

[1] International ¼-inch rule.

[2] For white, red, and yellow pines "Other" is grade 4. For hardwoods "Other" is tie and timber logs. Other softwoods were not graded into standard-lumber grades.

[3] Includes a small volume of other white oaks.

Table 61.—*Sampling errors for growing stock on commercial forest land by species and geographic unit in Ohio, 1968*

(In percent)

Species	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
White and red pine	46	(*)	(*)	—	(**)	38
Virginia pine	21	27	(**)	—	(**)	16
Other yellow pines	29	32	(*)	—	—	26
Other softwoods	37	(*)	(*)	(*)	(**)	36
Total softwoods	16	22	39	(*)	(*)	14
Select white oaks	7	7	10	21	22	5
Select red oaks	9	9	9	21	22	7
Chestnut oak	10	12	29	—	(*)	8
Other red oaks	7	8	11	27	37	6
Hickory	7	8	9	25	17	6
Hard maple	13	13	14	26	26	10
Soft maple	16	17	11	18	29	10
Beech	21	15	15	31	39	13
Ash species	12	15	13	16	14	7
Aspen and cottonwood	39	22	21	43	46	15
Basswood	28	34	40	36	37	20
Yellow-poplar	11	12	14	34	(*)	8
Black walnut	17	16	16	39	22	9
Black cherry	22	19	11	23	31	9
Sycamore	19	24	40	(*)	(*)	19
Black locust	18	29	21	(*)	46	13
Elm	13	14	10	18	29	7
Sassafras	23	33	20	(*)	—	14
Other hardwoods	10	16	15	42	—	9
Total hardwoods	2	2	3	6	6	2
All species	2	2	3	6	6	2

*Sampling error 50 to 99 percent.
**Sampling error 100 percent or more

Table 62.—*Sampling errors for sawtimber on commercial forest land by species and geographic unit in Ohio, 1968*

(In percent)

Species	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
White and red pine	—	(*)	(*)	—	—	(*)
Virginia pine	23	28	—	—	—	18
Other yellow pines	30	38	(**)	—	—	21
Other softwoods	(*)	(**)	(*)	(**)	—	44
Total softwoods	17	23	(*)	(**)	—	15
Select white oaks	8	8	11	22	24	6
Select red oaks	10	10	11	23	25	7
Chestnut oak	11	13	35	—	(*)	9
Other red oaks	8	9	11	32	38	6
Hickory	10	11	11	31	20	8
Hard maple	16	15	16	32	30	13
Soft maple	21	23	15	22	30	13
Beech	23	17	16	31	38	14
Ash species	15	17	14	21	17	8
Aspen and cottonwood	(*)	44	37	—	(*)	28
Basswood	30	39	48	36	40	22
Yellow-poplar	12	15	15	35	(*)	9
Black walnut	20	21	22	(*)	29	12
Black cherry	28	23	15	32	39	12
Sycamore	21	26	46	(*)	(*)	22
Black locust	35	36	30	—	(*)	23
Elm	17	18	12	20	(*)	10
Sassafras	35	(*)	(*)	(*)	—	26
Other hardwoods	14	18	16	—	31	12
Total hardwoods	3	3	3	7	7	2
All species	3	3	3	7	7	1

*Sampling error 50 to 99 percent.
**Sampling error 100 percent or more

Table 63.—*Average annual growth of growing stock on commercial forest land in Ohio, by species and geographic unit, 1951-67*

(In thousands of cubic feet)

Species	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
White and red pine	42	240	578	—	—	860
Yellow pines	2,170	486	228	—	—	2,884
Other softwoods[1]	104	65	287	[2]	[2]	456
Total softwoods	2,316	791	1,093	[2]	[2]	4,200
Select white and red oaks	9,916	5,360	5,517	6,180	2,523	29,496
Other white and red oaks	10,652	5,186	3,859	3,074	405	23,176
Hickory	4,112	1,955	2,084	1,490	3,158	12,799
Hard maple	1,670	1,725	1,609	2,155	1,418	8,577
Soft maple	1,553	882	1,688	2,419	96	6,638
Beech	211	405	585	719	371	2,291
Ash-walnut-cherry	3,566	1,865	6,254	4,572	5,090	21,347
Yellow-poplar	2,848	4,223	5,296	1,924	39	14,330
Other hardwoods	5,345	3,384	7,804	—1,535	—5,052	9,946
Total hardwoods	39,873	24,985	34,696	20,998	8,048	128,600
All species	42,189	25,776	35,789	20,998	8,048	132,800
	(Sampling errors, in percent)					
All softwoods	46	(*)	(**)	—	—	39
All hardwoods	11	12	21	21	(*)	9
All species	11	12	20	21	(*)	9

[1] May include a small volume of hemlock.

[2] Negligible.

* Sampling errors of 50 to 99 percent.

** Sampling errors of 100 per cent or more

Table 64.—*Average annual removals of growing stock on commercial forest land in Ohio, by species and geographic unit, 1951-67*

(In thousands of cubic feet)

Species	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
Yellow pines	1,637	512	551	—	—	2,700
Other softwoods	—	—	—	[1]	[1]	[1]
Total softwoods	1,637	512	551	[1]	[1]	2,700
Select white and red oaks	3,589	2,610	1,625	2,247	3,752	13,823
Other white and red oaks	7,288	3,257	3,010	359	1,789	15,703
Hickory	1,340	353	277	48	1,183	3,201
Hard maple	72	294	—	1,637	411	2,414
Soft maple	26	—	24	1,004	—	1,054
Beech	584	97	678	1,466	—	2,825
Ash-walnut cherry	1,130	825	2,706	1,396	1,550	7,607
Yellow-poplar	687	652	328	213	506	2,386
Other hardwoods	3,869	[2]1,393	2,234	1,651	9,640	18,787
Total hardwoods	18,585	9,481	10,882	10,021	18,831	67,800
All species	20,222	9,993	11,433	10,021	18,831	70,500
	(Sampling errors, in percent)					
All softwoods	(**)	(**)	(**)	—	—	(*)
All hardwoods	26	22	23	26	37	13
All species	25	22	23	26	27	14

[1] Negligible.
[2] Includes 49,000 cubic feet of yellow birch.
* Sampling errors of 50 to 99 percent.
** Sampling errors of 100 percent or more.

Table 65.—*Average annual growth of sawtimber on commercial forest land in Ohio by by species and geographic unit, 1951-67*

(In thousands of board feet)[1]

Species	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
White and red pine	—	313	1,335	—	—	1,648
Yellow pines	8,553	2,286	71	—	—	10,910
Other softwoods[2]	370	34	1,038	[3]	[3]	1,442
Total softwoods	8,923	2,633	2,444	[3]	[3]	14,000
Select white and red oaks	35,665	21,254	23,038	17,937	9,441	107,335
Other white and red oaks	36,604	19,976	13,282	6,021	2,737	78,620
Hickory	13,930	5,195	6,887	6,139	9,725	41,876
Hard maple	5,634	2,959	4,142	7,487	4,526	24,748
Soft maple	4,771	2,485	4,613	8,492	387	20,748
Beech	1,144	2,372	3,044	3,959	2,351	12,870
Ash-walnut-cherry	9,567	6,575	12,117	11,819	8,151	48,229
Yellow-poplar	12,097	17,039	23,334	6,146	356	58,972
Other hardwoods	13,244	9,259	16,637	—4,366	—20,172	14,602
Total hardwoods	132,656	87,114	107,094	63,634	17,502	408,000
All species	141,579	89,747	109,538	63,634	17,502	422,000
	(Sampling errors, in percent)					
All softwoods	39	39	39	—	—	39
All hardwoods	13	17	21	21	(*)	9
All species	12	17	21	21	(*)	9

[1] International ¼-inch rule.
[2] May include a small amount of hemlock.
[3] Negligible.
* Sampling errors of 50 to 99 percent.

Table 66.—*Average annual removals of sawtimber on commercial forest land in Ohio by species and geographic unit, 1951-67*

(In thousands of board feet)[1]

Species	Geographic unit					
	South-central	South-eastern	East-central	North-eastern	Western	All units
Yellow pines	7,577	2,372	2,551	—	—	12,500
Other softwoods	—	—	—	[2]	[2]	[2]
Total softwoods	7,577	2,372	2,551	[2]	[2]	12,500
Select white and red oaks	8,408	9,922	7,391	8,573	13,234	47,528
Other white and red oaks	19,172	13,245	11,763	645	5,842	50,667
Hickory	1,622	1,381	899	—	3,506	7,408
Hard maple	287	1,153	—	6,345	1,386	9,171
Soft maple	—	—	—	3,889	—	3,889
Beech	1,971	494	3,205	5,680	—	11,350
Ash-walnut-cherry	3,232	3,441	6,461	4,082	5,728	22,944
Yellow-poplar	1,993	2,550	1,244	825	1,961	8,573
Other hardwoods	14,968	—	3,936	4,558	12,008	35,470
Total hardwoods	51,653	32,186	34,899	34,597	43,665	197,000
All species	59,230	34,558	37,450	34,597	43,665	209,500
	(Sampling errors, in percent)					
All softwoods	(**)	(**)	(**)	—	—	(**)
All hardwoods	33	28	26	27	26	13
All species	33	28	26	27	26	13

[1] International ¼-inch rule.
[2] Negligible.
* Sampling errors of 50 to 99 percent.
** Sampling errors of 100 percent or more.

Table 67.—*Area of Ohio, by land classes and by geographic units and counties, 1968*

County	Total land area[1]	Nonforest land area	Forest-land area			
			Noncommercial[2]	Commercial		Sampling error[3]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Percent*	*Percent*
SOUTH-CENTRAL UNIT						
Adams	375.9	188.8	0.2	186.9	50	6
Brown	313.9	237.1	—	76.8	24	12
Clermont	293.3	202.3	.8	90.2	31	9
Gallia	301.4	142.3	—	159.1	53	7
Highland	351.4	267.2	2.2	82.0	23	12
Jackson	267.9	126.3	.3	141.3	53	8
Lawrence	291.5	83.4	—	208.1	71	6
Pike	283.6	114.2	.9	168.5	59	6
Ross	439.6	269.3	1.0	169.3	39	7
Scioto	389.2	129.5	.2	259.5	67	5
Total	3,307.7	1,760.4	5.6	1,541.7	47	2
SOUTHEASTERN UNIT						
Athens	322.6	104.8	2.5	215.3	67	7
Hocking	269.4	71.0	1.6	196.8	73	6
Meigs	278.7	110.6	.6	167.5	60	7
Morgan	268.5	151.2	2.4	114.9	43	10
Perry	262.1	129.2	—	132.9	51	10
Vinton	262.7	66.8	1.7	194.2	74	6
Washington	410.2	159.1	—	251.1	61	6
Total	2,074.2	792.7	8.8	1,272.7	61	2
EAST-CENTRAL UNIT						
Belmont	342.0	183.7	1.6	156.7	46	9
Carroll	249.9	136.1	.7	113.1	45	11
Coshocton	359.6	211.2	.2	148.2	41	10
Guernsey	337.7	182.3	13.2	142.2	42	10
Harrison	256.6	117.9	1.3	137.4	54	11
Holmes	271.1	177.6	—	93.5	34	13
Jefferson	262.8	114.6	.9	147.3	56	9
Monroe	291.8	108.0	—	183.8	63	8
Muskingum	427.0	251.4	1.5	174.1	41	9
Noble	255.0	139.3	.9	114.8	45	12
Tuscarawas	364.2	207.9	.5	155.8	43	10
Total	3,417.7	1,830.0	20.8	1,566.9	46	3

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Table 67.—Continued

County	Total land area[1]	Nonforest land area	Forest-land area			
			Noncommercial[2]	Commercial		Sampling error[3]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Percent*	*Percent*
			NORTHEASTERN UNIT			
Ashland	271.1	226.1	1.0	44.0	16	28
Ashtabula	448.1	326.4	1.7	120.0	27	17
Columbiana	341.6	243.3	1.3	97.0	28	19
Cuyahoga	291.8	250.1	—	41.7	14	32
Erie	168.8	149.0	.5	19.3	11	45
Geauga	260.5	174.6	.9	85.0	33	25
Huron	318.0	273.0	—	45.0	14	29
Lake	148.0	104.6	.9	42.5	29	38
Lorain	316.7	271.8	1.7	43.2	14	31
Mahoning	265.7	209.6	2.4	53.7	20	29
Medina	271.8	224.4	—	47.4	17	28
Portage	316.6	221.6	12.8	82.2	26	20
Richland	317.2	263.3	.3	53.6	17	28
Stark	368.3	326.3	—	42.0	11	29
Summit	262.7	203.9	—	58.8	22	26
Trumbull	393.4	294.0	1.9	97.5	25	21
Wayne	358.9	311.5	—	47.4	13	25
Total	5,119.2	4,073.5	25.4	1,020.3	20	6
			WESTERN UNIT			
Allen	262.1	246.9	.1	15.1	6	39
Auglaize	255.9	241.2	.1	14.6	6	37
Butler	301.2	263.3	.9	37.0	12	37
Champaign	276.5	255.7	.4	20.4	7	46
Clark	257.3	244.4	—	12.9	5	39
Clinton	262.5	243.5	1.0	18.0	7	37
Crawford	258.6	236.5	—	22.1	9	41
Darke	387.1	364.7	—	22.4	6	31
Defiance	263.7	236.1	.2	27.4	10	34
Delaware	287.7	266.4	.5	20.8	7	44
Fairfield	323.0	286.3	.5	36.2	11	31
Fayette	259.8	252.5	—	7.3	3	41
Franklin	344.1	326.9	1.3	15.9	5	35
Fulton	260.3	242.8	.3	17.2	7	37
Greene	265.8	246.5	.8	18.5	7	31
Hamilton	265.1	219.6	3.1	42.4	16	27
Hancock	340.3	317.1	.1	23.1	7	33
Hardin	298.9	281.7	—	17.2	6	45
Henry	265.9	254.7	—	11.2	4	32
Knox	339.9	276.5	—	63.4	19	25

CONTINUED

Table 67.—Continued

County	Total land area[1]	Nonforest land area	Forest-land area			
			Noncommercial[2]	Commercial		Sampling error[3]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Percent*	*Percent*
Licking	439.0	375.1	.8	63.1	14	27
Logan	294.5	268.0	.3	26.2	9	46
Lucas	219.8	198.2	—	21.6	10	39
Madison	297.0	286.8	.1	10.1	3	41
Marion	259.1	246.8	.1	12.2	5	43
Mercer	290.7	275.7	—	15.0	5	36
Miami	260.3	248.9	—	11.4	4	40
Montgomery	293.4	274.3	1.4	17.7	6	41
Morrow	258.1	224.7	.1	33.3	13	35
Ottawa	167.3	159.7	.3	7.3	4	48
Paulding	266.9	248.6	—	18.3	7	28
Pickaway	324.5	310.4	.7	13.4	4	36
Preble	273.5	249.4	2.0	22.1	8	45
Putnam	311.0	295.8	—	15.2	5	39
Sandusky	261.9	246.9	—	15.0	6	50
Seneca	352.6	328.9	—	23.7	7	38
Shelby	261.1	238.1	.3	22.7	9	37
Union	277.8	259.6	—	18.2	7	33
Van Wert	261.8	252.3	—	9.5	4	38
Warren	261.1	231.8	.1	29.2	11	37
Williams	269.3	241.7	—	27.6	10	36
Wood	396.3	383.0	—	13.3	3	40
Wyandot	259.8	241.4	—	18.4	7	37
Total	12,332.5	11,389.4	15.5	927.6	8	6
All counties	26,251.3	19,846.0	76.1	6,329.2	24	2

[1] Source: United States Bureau of the Census, Area Measurement Reports, Ohio, 1960, 1967.
[2] Productive-reserved forest land.
[3] In percent for commercial forest land, at the 68-percent probability level.

Table 68.—*Area of commercial forest land in Ohio, by ownership classes and by geographic units and counties, 1968*

(In thousands of acres)

County	Public[1]	Private	Total
	SOUTH-CENTRAL UNIT		
Adams	16.3	170.6	186.9
Brown	.8	76.0	76.8
Clermont	—	90.2	90.2
Gallia	4.8	154.3	159.1
Highland	.9	81.1	82.0
Jackson	6.6	134.7	141.3
Lawrence	40.7	167.4	208.1
Pike	10.3	158.2	168.5
Ross	22.9	146.4	169.3
Scioto	59.6	199.9	259.5
Total	162.9	1,378.8	1,541.7
	SOUTHEASTERN UNIT		
Athens	11.7	203.6	215.3
Hocking	28.2	168.6	196.8
Meigs	2.3	165.2	167.5
Morgan	4.5	110.4	114.9
Perry	18.8	114.1	132.9
Vinton	27.2	167.0	194.2
Washington	11.8	239.3	251.1
Total	104.5	1,168.2	1,272.7
	EAST-CENTRAL UNIT		
Belmont	2.6	154.1	156.7
Carroll	3.1	110.0	113.1
Coshocton	5.2	143.0	148.2
Guernsey	.8	141.4	142.2
Harrison	7.8	129.6	137.4
Holmes	—	93.5	93.5
Jefferson	3.6	143.7	147.3
Monroe	5.4	178.4	183.8
Muskingum	5.3	168.8	174.1
Noble	1.3	113.5	114.8
Tuscarawas	1.4	154.4	155.8
Total	36.5	1,530.4	1,566.9

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Table 68.—Continued

County	Public	Private	Total
	NORTHEASTERN UNIT		
Ashland	4.4	39.6	44.0
Ashtabula	.7	119.3	120.0
Columbiana	2.4	94.6	97.0
Cuyahoga	—	41.7	41.7
Erie	1.1	18.2	19.3
Geauga	3.7	81.3	85.0
Huron	1.3	43.7	45.0
Lake	.2	42.3	42.5
Lorain	.2	43.0	43.2
Mahoning	1.1	52.6	53.7
Medina	.3	47.1	47.4
Portage	6.3	75.9	82.2
Richland	1.1	52.5	53.6
Stark	1.1	40.9	42.0
Summit	.5	58.3	58.8
Trumbull	7.9	89.6	97.5
Wayne	.5	46.9	47.4
Total	32.8	987.5	1,020.3
	WESTERN UNIT		
Allen	.1	15.0	15.1
Auglaize	—	14.6	14.6
Butler	.1	36.9	37.0
Champaign	.1	20.3	20.4
Clark	—	12.9	12.9
Clinton	—	18.0	18.0
Crawford	—	22.1	22.1
Darke	.1	22.3	22.4
Defiance	.2	27.2	27.4
Delaware	—	20.8	20.8
Fairfield	—	36.2	36.2
Fayette	—	7.3	7.3
Franklin	—	15.9	15.9
Fulton	1.3	15.9	17.2
Greene	.8	17.7	18.5
Hamilton	—	42.4	42.4
Hancock	—	23.1	23.1
Hardin	—	17.2	17.2
Henry	.9	10.3	11.2
Knox	.7	62.7	63.4
Licking	—	63.1	63.1
Logan	—	26.2	26.2
Lucas	1.1	20.5	21.6

CONTINUED

Table 68.—Continued

County	Public	Private	Total
Madison	—	10.1	10.1
Marion	.4	11.8	12.2
Mercer	.1	14.9	15.0
Miami	—	11.4	11.4
Montgomery	.1	17.6	17.7
Morrow	.2	33.1	33.3
Ottawa	1.6	5.7	7.3
Paulding	—	18.3	18.3
Pickaway	.2	13.2	13.4
Preble	.9	21.2	22.1
Putnam	—	15.2	15.2
Sandusky	.1	14.9	15.0
Seneca	.1	23.6	23.7
Shelby	—	22.7	22.7
Union	—	18.2	18.2
Van Wert	—	9.5	9.5
Warren	.4	28.8	29.2
Williams	.1	27.5	27.6
Wood	—	13.3	13.3
Wyandot	1.4	17.0	18.4
Total	11.0	916.6	927.6
All counties	347.7	5,981.5	6,329.2

[1] From ownership records.

Table 69.—*Net volume of growing stock on commercial forest land in Ohio, by species groups and by geographic units and counties, 1968*

(In millions of cubic feet)

County	Softwoods	Hardwoods	Total	Sampling error of total (percent)
		SOUTH-CENTRAL UNIT		
Adams	6.6	123.9	130.5	8
Brown	2.6	41.6	44.2	16
Clermont	3.0	71.3	74.3	11
Gallia	5.4	99.7	105.1	11
Highland	2.5	52.5	55.0	14
Jackson	4.8	99.1	103.9	10
Lawrence	8.7	153.5	162.2	9
Pike	5.8	128.4	134.2	9
Ross	5.9	130.4	136.3	9
Scioto	8.8	197.9	206.7	7
Total	54.1	1,098.3	1,152.4	2
		SOUTHEASTERN UNIT		
Athens	4.6	139.5	144.1	9
Hocking	5.0	131.2	136.2	9
Meigs	3.0	113.2	116.2	9
Morgan	2.4	62.4	64.8	12
Perry	3.5	78.0	81.5	13
Vinton	3.6	137.9	141.5	8
Washington	5.5	159.4	164.9	8
Total	27.6	821.6	849.2	2
		EAST-CENTRAL UNIT		
Belmont	2.9	88.9	91.8	11
Carroll	1.9	61.5	63.4	15
Coshocton	2.6	82.4	85.0	12
Guernsey	2.6	75.5	78.1	13
Harrison	2.3	59.3	61.6	16
Holmes	1.6	58.8	60.4	15
Jefferson	2.8	85.5	88.3	12
Monroe	3.8	110.3	114.1	11
Muskingum	3.2	99.0	102.2	11
Noble	2.0	53.0	55.0	16
Tuscarawas	2.7	82.6	85.3	13
Total	28.4	856.8	885.2	3

CONTINUED

Table 69.—Continued

County	Softwoods	Hardwoods	Total	Sampling error of total (percent)
		NORTHEASTERN UNIT		
Ashland	.2	30.0	30.2	38
Ashtabula	.6	81.4	82.0	26
Columbiana	.6	62.4	63.0	28
Cuyahoga	1	25.1	25.2	42
Erie	.1	11.1	11.2	35
Geauga	.3	51.4	51.7	37
Huron	.2	27.5	27.7	40
Lake	.2	28.8	29.0	61
Lorain	.1	24.2	24.3	47
Mahoning	.3	34.3	34.6	42
Medina	.2	28.0	28.2	40
Portage	.4	52.3	52.7	26
Richland	.1	24.9	25.0	45
Stark	.2	24.8	25.0	38
Summit	.2	33.8	34.0	39
Trumbull	.3	58.6	58.9	32
Wayne	.4	33.8	34.2	31
Total	4.5	632.4	636.9	6
		WESTERN UNIT		
Allen	—	11.6	11.6	50
Auglaize	—	11.3	11.3	45
Butler	.1	16.4	16.5	53
Champaign	.1	10.8	10.9	46
Clark	—	9.5	9.5	45
Clinton	—	14.2	14.2	51
Crawford	—	17.0	17.0	49
Darke	—	16.8	16.8	35
Defiance	—	21.9	21.9	45
Delaware	.1	10.8	10.9	58
Fairfield	.1	29.2	29.3	40
Fayette	—	4.2	4.2	35
Franklin	—	10.5	10.5	44
Fulton	—	15.1	15.1	48
Greene	—	13.6	13.6	38
Hamilton	.1	32.1	32.2	32
Hancock	—	18.0	18.0	42
Hardin	—	13.8	13.8	60
Henry	—	9.1	9.1	39

CONTINUED

Table 69.—Continued

County	Softwoods	Hardwoods	Total	Sampling error of total (percent)
Knox	.1	43.2	43.3	30
Licking	.1	37.9	38.0	35
Logan	.1	17.1	17.2	58
Lucas	—	14.2	14.2	39
Madison	.1	5.7	5.8	32
Marion	—	9.2	9.2	55
Mercer	—	11.7	11.7	47
Miami	—	8.4	8.4	48
Montgomery	—	12.2	12.2	51
Morrow	.1	23.9	24.0	42
Ottawa	—	3.4	3.4	37
Paulding	—	15.7	15.7	38
Pickaway	—	10.3	10.3	53
Preble	.1	13.4	13.5	53
Putnam	—	12.5	12.5	54
Sandusky	—	9.0	9.0	54
Seneca	—	18.3	18.3	51
Shelby	—	16.8	16.8	46
Union	—	14.8	14.8	43
Van Wert	—	6.6	6.6	54
Warren	.1	20.1	20.2	49
Williams	.1	22.2	22.3	45
Wood	—	8.5	8.5	41
Wyandot	—	14.9	14.9	49
Total	1.3	655.9	657.2	6
All counties	115.9	4,065.0	4,180.9	2

Table 70.—*Net volume of sawtimber on commercial forest land in Ohio, by species groups and by geographic units and counties, 1968*

(In millions of board feet)[1]

County	Softwoods	Hardwoods	Total	Sampling error of total (percent)
		SOUTH-CENTRAL UNIT		
Adams	22.3	400.8	423.1	10
Brown	7.8	130.5	138.3	20
Clermont	11.1	243.1	254.2	13
Gallia	17.7	316.3	334.0	14
Highland	8.7	170.9	179.6	18
Jackson	17.0	330.2	347.2	12
Lawrence	28.4	516.3	544.7	12
Pike	22.0	425.9	447.9	11
Ross	21.2	438.0	459.2	12
Scioto	32.4	653.3	685.7	9
Total	188.6	3,625.3	3,813.9	3
		SOUTHEASTERN UNIT		
Athens	13.7	492.1	505.8	11
Hocking	15.1	455.2	470.3	12
Meigs	8.8	401.6	410.4	12
Morgan	6.0	214.7	220.7	16
Perry	9.3	273.0	282.3	16
Vinton	11.2	484.0	495.2	10
Washington	15.7	552.5	568.2	10
Total	79.8	2,873.1	2,952.9	3
		EAST-CENTRAL UNIT		
Belmont	7.4	310.4	317.8	14
Carroll	4.6	208.5	213.1	19
Coshocton	6.4	289.0	295.4	15
Guernsey	6.2	262.5	268.7	16
Harrison	4.4	197.7	202.1	20
Holmes	4.5	208.4	212.9	18
Jefferson	7.3	298.6	305.9	15
Monroe	10.1	383.3	393.4	14
Muskingum	8.2	341.8	350.0	14
Noble	4.2	179.2	183.4	21
Tuscarawas	6.5	283.9	290.4	16
Total	69.8	2,963.3	3,033.1	3

CONTINUED

Table 70.—Continued

County	Softwoods	Hardwoods	Total	Sampling error of total (percent)
		NORTHEASTERN UNIT		
Ashland	.6	104.4	105.0	48
Ashtabula	1.5	280.6	282.1	33
Columbiana	1.4	215.5	216.9	36
Cuyahoga	.4	85.0	85.4	54
Erie	.1	39.4	39.5	40
Geauga	.8	174.3	175.1	47
Huron	.6	95.8	96.4	51
Lake	.5	99.1	99.6	77
Lorain	.1	79.6	79.7	61
Mahoning	.7	119.0	119.7	54
Medina	.5	95.6	96.1	51
Portage	1.0	183.1	184.1	33
Richland	.3	81.0	81.3	59
Stark	.6	86.0	86.6	49
Summit	.6	115.0	115.6	50
Trumbull	.7	197.9	198.6	41
Wayne	.9	120.9	121.8	38
Total	11.3	2,172.2	2,183.5	7
		WESTERN UNIT		
Allen	—	46.6	46.6	59
Auglaize	—	44.5	44.5	47
Butler	—	63.2	63.2	60
Champaign	—	42.5	42.5	50
Clark	—	37.5	37.5	47
Clinton	—	55.9	55.9	59
Crawford	—	67.4	67.4	57
Darke	—	65.1	65.1	40
Defiance	—	86.7	86.7	54
Delaware	—	41.9	41.9	63
Fairfield	—	114.7	114.7	49
Fayette	—	16.1	16.1	41
Franklin	—	41.3	41.3	52
Fulton	—	58.9	58.9	57
Greene	—	52.5	52.5	43

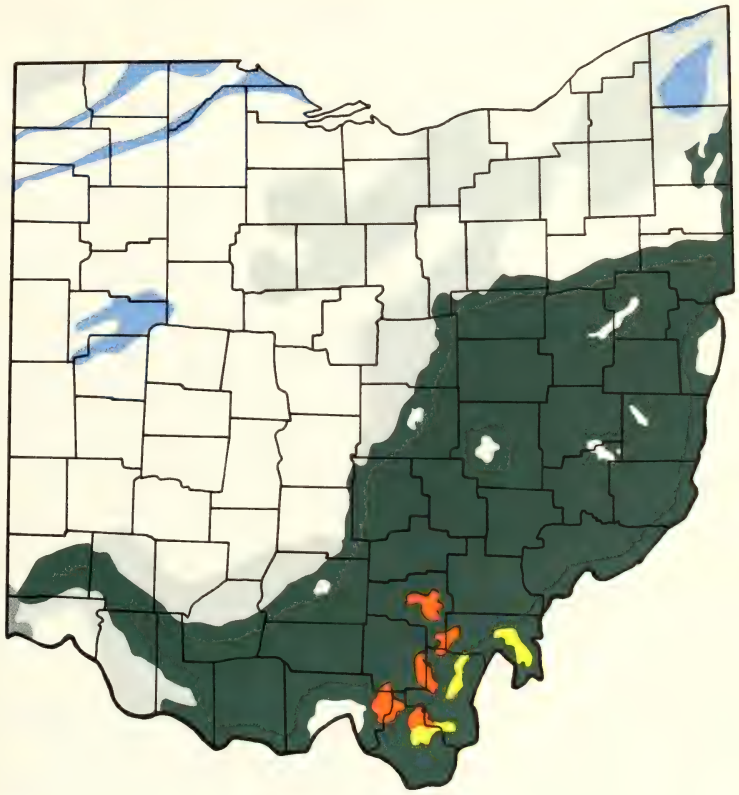
CONTINUED

Table 70.—Continued

County	Softwoods	Hardwoods	Total	Sampling error of total (percent)
Hamilton	—	123.3	123.3	35
Hancock	—	70.5	70.5	51
Hardin	—	53.4	53.4	67
Henry	—	36.5	36.5	51
Knox	—	173.6	173.6	38
Licking	—	144.7	144.7	41
Logan	—	66.4	66.4	66
Lucas	—	55.8	55.8	42
Madison	—	22.7	22.7	36
Marion	—	34.9	34.9	60
Mercer	—	47.0	47.0	57
Miami	—	32.6	32.6	52
Montgomery	—	45.6	45.6	56
Morrow	—	93.9	93.9	50
Ottawa	—	12.5	12.5	44
Paulding	—	60.6	60.6	46
Pickaway	—	40.5	40.5	61
Preble	—	52.0	52.0	57
Putnam	—	49.6	49.6	62
Sandusky	—	34.9	34.9	63
Seneca	—	72.7	72.7	59
Shelby	—	65.3	65.3	54
Union	—	58.4	58.4	52
Van Wert	—	25.5	25.5	58
Warren	—	79.5	79.5	57
Williams	—	88.5	88.5	54
Wood	—	33.7	33.7	44
Wyandot	—	58.8	58.8	57
Total	—	2,568.2	2,568.2	7
All counties	349.5	14,202.1	14,551.6	1

[1] International ¼-inch rule.

THE MAJOR FOREST TYPES OF OHIO



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THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

The TIMBER RESOURCES of NEW YORK

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1970

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

PREFACE

UNDER THE AUTHORITY of the McSweeney-McNary Forest Research Act of May 22, 1928, and subsequent amendments, the Forest Service, U.S. Department of Agriculture, conducts a series of continuing forest surveys of all states to provide up-to-date information about the forest resources of the Nation.

The first forest survey of New York was made in 1948-50 by the Northeastern Forest Experiment Station, with cooperation from the New York Department of Conservation.

A resurvey of timber resources of New York was made in 1966-68, again with the cooperation of the Department of Conservation. The Department purchased the aerial photographs that were used for the resurvey, provided funds for additional field plots for obtaining more precise data, and gathered information on the output of timber products.

This resurvey of the State was directed by Carl E. Mayer, leader of the forest-survey project. He was assisted by John H. Zerbe, field supervisor, who was in charge of many field crews over the 3-year period. Joseph E. Barnard had charge of translating photo-plot and field-plot data into computer inputs, implementing the generalized computer program to process the inputs, and obtaining computer outputs for the statistics used in this report. James T. Bones, David R. Dickson, and Neal P. Kingsley collected and compiled data on timber removals with the assistance of Tom D. Shearer of the State of New York Conservation Department. Teresa M. Bowers assisted in the sampling design, in checking statistical data, and in making tables from the computer output.

COVER PHOTO: Cranberry Lake in the northern Adirondack region. *New York Conservation Dep. photo.*

The TIMBER RESOURCES of NEW YORK

by Roland H. Ferguson and Carl E. Mayer

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New York Conservation Dep. photo.

The southern Catskill region.

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The Resurvey

THE RESURVEY of the timber resources in New York State was made in 1966-68, about 18 years after the first forest survey of New York. In those 18 years, many changes have taken place.

This report was prepared to summarize the present timber-resource situation and the many changes that have taken place, to show the trends in the timber supply, and to show how the timber is being used by the timber-based industries.

New York State was divided into eight geographic units for the resurvey, each unit as homogeneous as possible in the selected combination of counties (fig. 1). At the time of the initial survey, data were collected, compiled, and published (*9*) for each of the 15 forest districts in the State. For comparison, the geographic units used in the resurvey were combined into three major regions, almost identical to those described in the first timber-resource report (*1*):

- Northern Region—St. Lawrence - Northern Adirondack, Western Adirondack, and Eastern Adirondack units.
- Southwestern Region—Lake Plain, Southwest Highlands, and South-Central Highlands units.
- Southeastern Region—Capitol District and Catskill - Lower Hudson units.

Two counties, Rockland and Nassau, that were included in the original survey are now mostly urban, so they were excluded from the resurvey. The 1950 data for these two counties are excluded from the recomputed 1950 estimates used in this report.[1]

[1] The percentage of change (including Rockland and Nassau County data and published 1950 estimates) shown in the report by Barnard and Bowers (*2*) is different from that in this report.

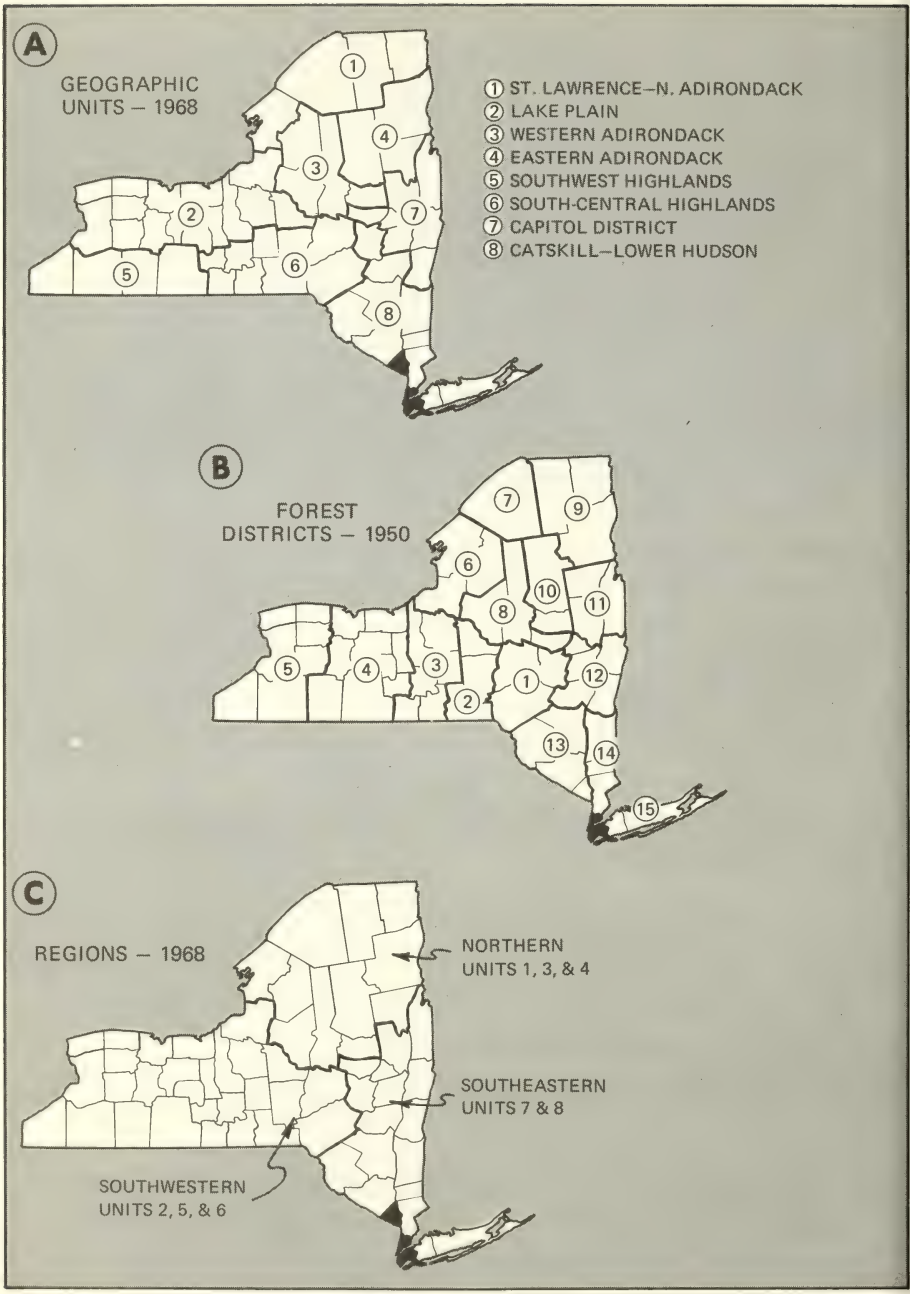

Figure 1.—Sampling units of the two forest surveys: A, geographic units for the resurvey; B, forest districts for the initial survey; and C, regional grouping of geographic units.

In the resurvey, a large number of initial field plots were remeasured to update the initial inventory volume and to provide estimates of average net annual growth, average annual timber removals, and land-use change. New ground plots were established for an independent second estimate. These two sets of estimates were weighted and combined to give the current estimates of forest area and timber volume.

Sampling errors, which indicate reliability, are shown for most of the totals. Users of these resource data are cautioned to read with care the definitions of terms and the section about reliability of the estimates, in the appendix.

Highlights

IN THE 18 YEARS between the first forest survey and the resurvey, many significant changes have taken place. The resurvey revealed that:

COMMERCIAL FOREST LAND now totals 14,281,000 acres, an increase of almost 14 percent in 18 years.

GROWING-STOCK VOLUME (trees 5.0 inches d.b.h. and larger) amounts to 12,200 million cubic feet, an increase of 20 percent.

SAWTIMBER VOLUME amounts to 24,408 million board feet, an increase of almost 11 percent.

NET ANNUAL GROWTH for 1967 was 282 million cubic feet of growing stock, including 656 million board feet of sawtimber.

TIMBER REMOVALS in 1967 was 137 million cubic feet of growing stock, including 463 million board feet of sawtimber.

SAWTIMBER STANDS make up 30 percent of the commercial forest-land area and average 3,900 board feet per acre.

POLETIMBER TREES comprise one-half of the growing-stock volume, 6.1 out of 12.2 billion cubic feet.

SAWTIMBER TREES that are less than 15.0 inches d.b.h. account for 56 percent of the total board-foot volume.

SOFTWOOD SPECIES make up about one-fourth of the growing-stock volume —3.2 billion cubic feet.

SUGAR MAPLE makes up one-sixth of the total volume, 2.0 billion cubic feet, including 3.9 billion board feet.

SOFT MAPLES had the greatest increase in volume—430 million cubic feet—and their present volume of 1.6 billion cubic feet ranks second only to sugar maple.

Timber-Resource Trends

NEW YORK, THE EMPIRE STATE, is well known to many people for many reasons—tall buildings on Manhattan, dense concentrations of hurrying people, the Thruway from Buffalo to Albany to the Big City, the New York Times, and the New York Yankees. Not so widely known is the significance of the State's timber resource. Although the consumption of timber and wood products per capita is much greater than the quantity that is being produced within the State, the forests in New York are increasing in both area and in timber volume. In the future they may supply a larger portion of the daily demand for timber and products made from wood.

Forest acreages and timber volumes reported for 1950 (*10*) increased significantly, the resurvey showed. Commercial forest-land area[2] increased almost 14 percent. Cubic-foot volume of growing-stock trees increased 20 percent.

TIMBER VOLUME INCREASED

Live tree volume, including sound-wood volume in rough and rotten trees, totaled 14.8 billion cubic feet in 1968, up from 12.0 billion in 1950. The volume in rough and rotten trees increased at double the rate for growing-stock trees—up almost 40 percent as compared to the 20-percent increase for growing stock. Some of this increase is due to a lower proportion of growing-stock volume in the total live-tree volume, and to leaving residual stands of rough and rotten trees. Sound-wood volume of rough and rotten trees in 1950 made up 15 percent of the volume for all live trees, and in 1968 this proportion increased to 17 percent.

The present volume of growing stock now exceeds 12 billion cubic feet, an increase of about 2 billion cubic feet over the 1950 estimate of 10.2 billion cubic feet. This increase was due principally to the large difference between the volume of growth and the volume of removals, and to some extent to the ingrowth

[2] See appendix for definitions of this and other terms used in this report.

of forest trees on land that became forest land during the period between surveys.

The growing-stock volume changes between surveys were not uniform throughout the State. The Catskill - Lower Hudson geographic unit had the greatest increase in volume—45 percent; six other units had increases that ranged from 12 to 36 percent. Only the Eastern Adirondack unit had a decrease in volume, as shown in the following tabulation:

Geographic unit	*1950 (million cubic feet)*	*1968 (million cubic feet)*	*Change (percent)*
Lake Plain	1,087	1,460	+34
Southwest Highlands	1,091	1,365	+25
South–Central Highlands	1,684	1,991	+18
St. Lawrence–N. Adirondack	1,283	1,744	+36
Western Adirondack	1,078	1,216	+13
Eastern Adirondack	1,615	1,343	—17
Capitol District	985	1,099	+12
Catskill–Lower Hudson	1,366	1,982	+45
State	10,189	12,200	+20

Counties with the largest volume of growing stock are scattered among three geographic units. St. Lawrence County has 762 million cubic feet, Essex 624 million, and Delaware 561 million. All but five counties in the resurvey had increases in growing-stock volume.[3] Fourteen counties had increases of more than 50 percent. Three of the counties that had decreases—Essex, Hamilton, and Warren—make up the Eastern Adirondack geographic unit.

Forest industries own about 10 percent of the growing-stock volume in New York. Public ownership (mostly state) accounts for another 8 percent. The remainder, roughly four-fifths, is owned by farmers, nonfarm rural residents, absentee owners, and other miscellaneous individuals and organizations. Softwoods make up 40 percent of the growing-stock volume on publicly owned forest land. On privately owned forest land, softwoods make up about 25 percent.

[3] These changes and other comparisons of data for 1950 and 1968 are based upon recomputed volumes for 1950. See discussion of "Comparisons Between Inventories" in the appendix.

Publicly owned stands of timber average about 1,100 cubic feet per acre while privately owned timber stands average almost 840 cubic feet per acre. This lower volume per acre is due partially to the large increase of commercial forest land from abandoned farmland that had little or no growing-stock volume in 1950 and now is classified as sapling-seedling stands.

Poletimber Makes Up A Greater Volume

Volume of poletimber trees makes up one-half of the growing-stock volume, an increase from the earlier proportion. The largest differences in volume between 1950 and 1968 are those for the 6- to 12-inch diameter classes (fig. 2). The volume of growing-stock trees in these classes increased 28 percent between surveys,

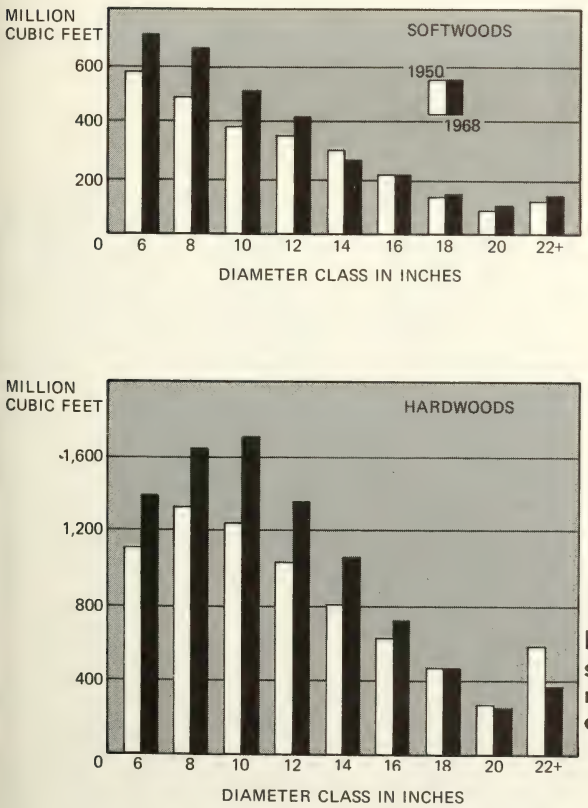

Figure 2. — Growing-stock volume increased more rapidly in the lower diameter classes.

whereas the volume in tree classes 14 inches and larger increased only 5 percent.

Softwoods and hardwoods increased in volume at approximately the same rate—about 20 percent—and their volume relationship to each other remained about the same. Hardwoods made up 74 percent of the growing-stock volume.

Sugar Maple Predominates Among Growing Stock

Sugar maple is more abundant than any other species in the State. It accounts for 2.0 billion cubic feet, one-sixth of the growing-stock volume. The soft maples (red and silver) were next in abundance with 1.6 billion cubic feet, and were followed closely by the oaks (all species combined) with 1.4 billion, and by hemlock with 1.1 billion. No other species had as much as 1.0 billion cubic feet.

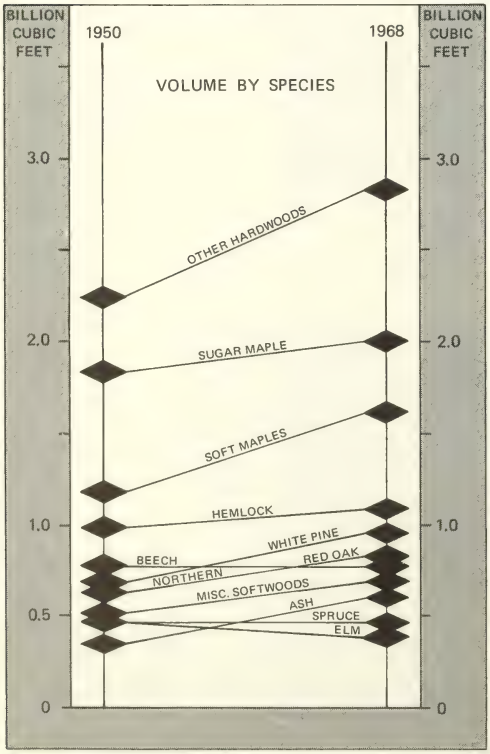

Figure 3.—Most species increased in volume, but volumes of beech and spruce remained about the same.

Most of the abundant species increased considerably in cubic-foot volume between surveys. Soft maples, white pine, northern red oak, and ash increased by more than 30 percent; and sugar maple and hemlock increased by almost 10 percent (fig. 3). Spruce and beech volumes remained about the same; but sweet birch, yellow birch, and elm decreased in volume. Elm had the greatest decrease, from 505 million to 391 million cubic feet, a decrease of more than 20 percent. This large loss was due principally to the Dutch elm disease.

Sawtimber Volume Increased 11 Percent

Even though the largest increases in volume were in the lower diameter classes, sawtimber volume increased 11 percent between surveys, to 24.4 billion board feet (fig. 4). This averages out to 1,700 board feet per acre of commercial forest land. Forty percent (9.7 billion board feet) of the sawtimber volume is in the three northern units, 35 percent (8.5 billion board feet) is

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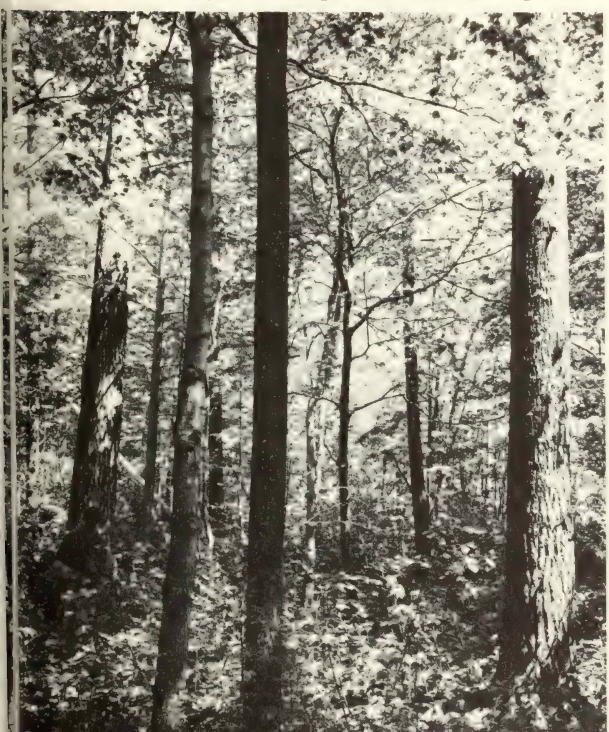


Figure 4. — This better-than-average sawtimber stand helped to increase total sawtimber volume by more than 10 percent.

in the three southwestern units, and 25 percent (6.1 billion board feet) in the two southeastern units.

Stand-size classes used in the resurvey were based upon plurality of stocking. Stands classified as sawtimber by this procedure averaged a little more than 3,900 board feet per acre for the State as a whole and about the same for each of the three major regions. In 1950 sawtimber stands (classified on a volume-per-acre basis) averaged 4,600 board feet per acre in the Southwestern and Northern Regions and only 2,900 board feet per acre in the Southeastern Region.

Volume Increased Most In Catskill-Lower Hudson Unit

Changes in the sawtimber-volume inventory varied considerably among the geographic units. These changes are the result of much larger sawtimber removals in some units than in others during the period between surveys. Changes ranged from a decrease of 28 percent in the Eastern Adirondack unit to an increase of 70 percent in the Catskill-Lower Hudson unit. The sawtimber volumes for each of the geographic units in 1950 and 1968, and their difference in percent, are shown in the tabulation below:

Geographic unit	*1950 (million board feet)*	*1968 (million board feet)*	*Change (percent)*
Lake Plain	2,904	2,815	−3
Southwest Highlands	2,032	2,360	+16
South–Central Highlands	3,247	3,368	+4
St. Lawrence–N. Adirondack	2,549	3,576	+40
Western Adirondack	2,784	2,816	+1
Eastern Adirondack	4,645	3,342	−28
Capitol District	1,539	2,209	+44
Catskill–Lower Hudson	2,307	3,922	+70
State	22,007	24,408	+11

Four counties in the State have an inventory volume of more than 1 billion board feet each—St. Lawrence 1.6, Essex 1.6, Lewis 1.1, and Franklin 1.0. About one-third of the counties in the State had decreases in sawtimber volume, ranging from a negligible decrease of 1 percent in Oswego County to decreases of 49 percent in Genesee and Hamilton Counties in the Lake

Plain and Eastern Adirondack units, respectively. Another third of the counties had increases of up to 50 percent, and the remaining third of the counties had increases of more than 50 percent.

Volume Increases Were Greatest For Small Sawtimber

More than one-half (56 percent) of the sawtimber volume is concentrated in trees less than 15.0 inches in diameter at breast height. Sawtimber trees in the 12- and 14-inch diameter classes and softwood sawtimber trees in the 10-inch diameter class together make up 13.7 billion board feet out of a total of 24.4 billion board feet for all diameter classes (fig. 5). At the time of the initial survey, the sawtimber volume was about equally divided between trees that were under 15.0 inches in diameter and those that were over 15.0 inches in diameter.

Softwood sawtimber volume in the State increased by more than 13 percent, and it now totals 7.0 billion board feet. However, the changes in sawtimber volume differed considerably among the three major regions. The volume of softwood sawtimber almost doubled between surveys in the three geographic units

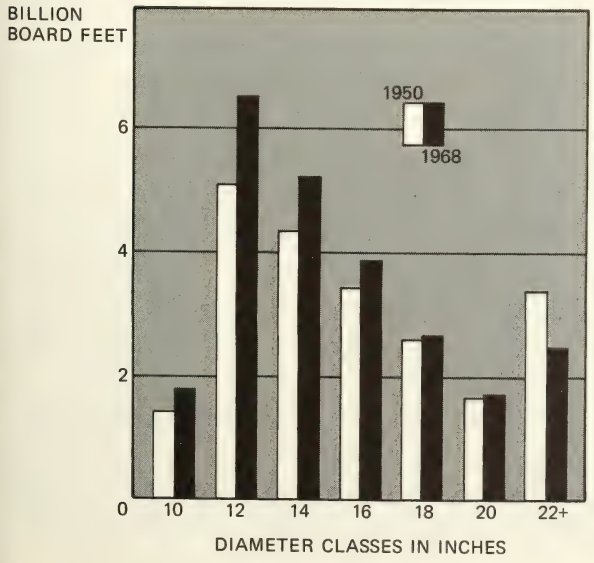


Figure 5. — Sawtimber volume in the 10- to 14-inch diameter classes increased 2.8 billion board feet, but the volume in the larger diameter classes decreased 0.4 billion board feet. The 10-inch class is for softwoods only.

that make up the Southwestern Region; but in the three geographic units that make up the Northern Region, the volume decreased about 10 percent. In the two geographic units that make up the Southeastern Region, softwood sawtimber volume increased almost 30 percent.

Hardwood sawtimber volume, for the State as a whole, increased 10 percent. In the northern units, the hardwood volume increased only 2 percent, not nearly enough to offset the big decrease in softwood volume. As a result, there was an overall decrease of 2.5 percent in sawtimber volume for the northern units. Sawtimber volume of hardwoods decreased 5 percent in the southwestern units; however, the large increase in softwoods made an increase in total sawtimber volume of slightly more than 4 percent. The biggest increase in hardwood sawtimber volume occurred in the southeastern units, where it reached a high of 80 percent.

Sugar maple makes up almost one-sixth (3.9 billion board feet) of the total sawtimber volume in the State. Four other species account for more than 2 billion board feet each—white pine (2.6 billion), hemlock (2.6 billion) soft maples (2.3 billion), and northern red oak (2.0 billion).

Few Species Decreased in Volume

Sawtimber volume of most species increased. Some increased more than 75 percent. Softwood sawtimber volume increased 13 percent and hardwood sawtimber volume increased 10 percent. However, some species decreased in volume. Sugar maple sawtimber volume (in 1950 nearly 4.5 billion board feet) decreased 14 percent to 3.9 billion board feet in 1968 (fig. 6). Beech decreased 7 percent to 1.8 billion board feet. Sawtimber volume of elm, spruce, and yellow birch decreased about 25 percent from about 1.2 billion board feet each to about 0.9 billion each.

Comparisons of sawtimber volume on a regional basis show that the volume of sugar maple is greater in the Southwestern Region than in either of the other regions, the volume of white pine is largest in the Southeastern Region, and the volume of hemlock is largest in the Northern Region.

The sawtimber volume of sugar maple ranges from 247 million board feet in the Capitol District unit to 684 million in the South-Central Highland unit. Sawtimber volumes of the other more abundant species also vary considerably by geographic units as indicated below, in millions of board feet:

Species	*Least volume*	*Unit*	*Greatest volume*	*Unit*
White pine	65	Southwest Highlands	609	Eastern Adirondack
Hemlock	150	Lake Plain	464	South-Central Highlands
Soft maples	99	Capitol District	421	South-Central Highlands
N. red oak	74	Western Adirondack	675	Catskill-Lower Hudson
Beech	55	Capitol District	383	St. Lawrence-N. Adirondack

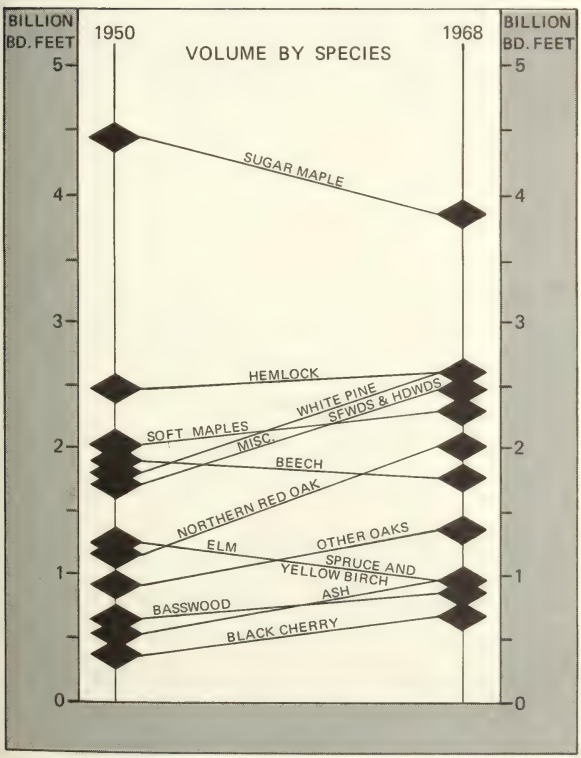


Figure 6.—The decrease in sugar maple board-foot volume was more than offset by the increase in northern red oak board-foot volume.

Hardwood Sawtimber Quality Has Declined Greatly

The quality of sawtimber, as expressed by the percentage of volume in standard-lumber log grade 1, has decreased between surveys. This is due to heavier cutting of sawtimber trees in the largest diameter classes and to the large volume of ingrowth. Trees that grew large enough in diameter to come into the sawtimber tree-size class during the 18-year period are too small to have a log that will meet the specifications for grade 1.

In the initial survey, the quality of white pine was based upon specifications for only three standard-lumber log grades; but in the resurvey, specifications for four grades were used. None of the grade specifications are identical to those used in 1950. Although not directly comparable, the volume of white pine that met grade 1 specifications on both surveys was only about 1 percent of the total board-foot volume for white pine.

Hardwood sawtimber volume (2.6 billion board feet) that meets log-grade 1 specifications makes up 15 percent of the total volume. This is about one-half, by both percentage and volume, of that that met the same specifications in 1950. Northern red oak was the only species that did not decrease significantly in quality; however, it did decrease from 27 percent to 25 percent (fig. 7). The group of other oaks had the next larger proportion of grade-1 volume—20 percent.

Soft maples and beech had the smallest proportion of their board-foot volume in grade-1 quality sawlogs as compared to any other hardwood species, in both 1950 and 1968. The volume of soft maples that met grade-1 specifications dropped from 24 percent of the total to 8 percent, and the volume of beech in this same class dropped from 16 percent to 5 percent.

FOREST AREA INCREASED

Big changes in land use took place in New York State during the past two or three decades. Farming on small farms and marginal cropland became less profitable; the younger generation born on farms left their homes to find more lucrative employment elsewhere; throughways and highways absorbed numerous

Figure 7. — Volume in high-quality trees like this made up 25 percent of the northern red oak sawtimber volume.

NEW YORK CONSERVATION DEP. PHOTO

farms that crossed their rights-of-ways. Thousands of farms were abandoned, and land formerly in crops and pasture reverted to weeds, brambles, and shrubs. Seeds of forest trees in nearby woods were dispersed far and wide over much of this abandoned land. The tree seeds began to germinate under favorable conditions, and eventually trees were to be seen in place of the farm crops of former years. Now this land is classified as commercial forest land.

According to the Census of Agriculture for 1945 and 1964, the number of farms decreased from 149,500 to 66,500, a reduction of 83,000 farms. The total acreage in farms (including farm woodlots) decreased more than 5 million acres in the 19-year period. There was a corresponding increase in the average size of farms from 117 to 185 acres.

On these farms in 1945, there were 8.4 million acres classified as cropland and another 4.5 million acres classified as pasture (excluding woodland pasture). The latest census (1964) shows that the cropland acreage has fallen to 6.5 million acres and the pasture land has dropped to 2.3 million acres. All together there was a reduction of 4.1 million acres of cropland and open pasture land. Much of this has reverted to forest land.

Largest Increases in Forest Land Were in the Southwest

Commercial forest-land area in the State increased 1.7 million acres, in the 18-year period between the two surveys, to the present total of 14.3 million acres. This is about a 14-percent increase. This large increase was not uniformly distributed among the geographic units. The Southwestern Region increased 23 percent, from 4.6 million to 5.7 million acres of commercial forest land. The Northern region averaged an increase of 15 percent and now contains 5.3 million acres of commercial forest land. A decrease of about 1½ percent occurred in the acreage of commercial forest land in the Southeastern Region.

Considerable variation is shown in the percentages of change among the geographic units that make up the three regions. These changes ranged from a 12-percent decrease for the Catskill-Lower Hudson unit to a 31-percent increase for the Lake Plain unit. Acreages for all geographic units and their percentages of change are shown below:

Geographic unit	*1950 (thousand acres)*	*1968 (thousand acres)*	*Change (percent)*
Lake Plain	1,440	1,889	+31
Southwest Highlands	1,480	1,656	+12
South-Central Highlands	1,699	2,153	+27
St. Lawrence–N. Adirondack	2,080	2,505	+20
Western Adirondack	1,259	1,488	+18
Eastern Adirondack	1,264	1,295	+ 2
Capitol District	1,009	1,240	+23
Catskill–Lower Hudson	2,335	2,055	—12
State	12,566	14,281	+14

Counties generally increased in commercial forest area between surveys. Twenty-two counties had increases in forest land of

more than 20 percent; 25 counties had increases of 1 to 20 percent; eight counties had decreases in commercial forest-land area. Only four counties in the State, other than the seven metropolitan counties excluded from the survey, have less than 20 percent of their land in commercial forest areas; Monroe County wtih 62,000 acres of forest had the lowest percentage, only 14 percent. Seven counties have more than 60 percent of their land area in commercial forests; Lewis County, with more than one-half million acres of commercial forest land, ranks highest with 68 percent.

Ownership of Commercial Forest Land Changed Slightly

Most of the commercial forest land (94 percent) is privately owned. Forest industry holdings total about 1.2 million acres, a slight increase over their 1950 holdings (fig. 8). The acreage of farmer-owned forest land is 3.7 million acres. This is larger than the acreage reported in 1950 for farm woodland (which is part of an operating farm but excludes forest land not adjacent

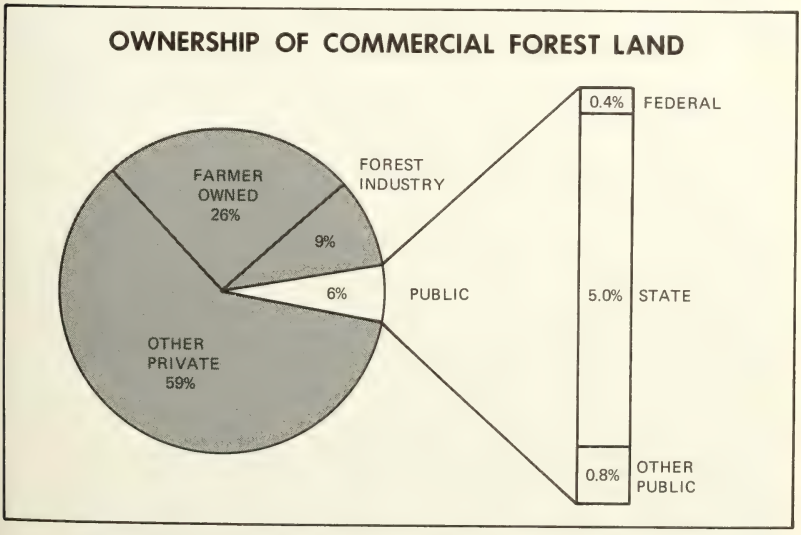


Figure 8.—All but 6 percent of the commercial forest land in New York is privately owned. The state owns 5 of that 6 percent.

to it). Nonfarm rural residents, absentee owners, and miscellaneous private ownerships account for almost 60 percent of the commercial forest land, or a total of 8.5 million acres.

The State has purchased, since 1930, a large acreage of abandoned farmland. Much of this land was planted to white pine, red pine, spruce, and other species (fig. 9). Some of this plantation timber is now being harvested. In addition to the State-owned plantations, privately owned plantations (consisting of different ages dating back over 50 years) are to be found throughout the State. The larger blocks of plantations are to be found on State-owned lands, whereas many of the privately owned plantations are 1 acre or less.

The 1968 estimate of plantation acreage, based upon Forest-Survey sample plots that fell in recognizable plantations, is 564,000 acres, although a much larger acreage was reported planted and the plantations had various degrees of survival.

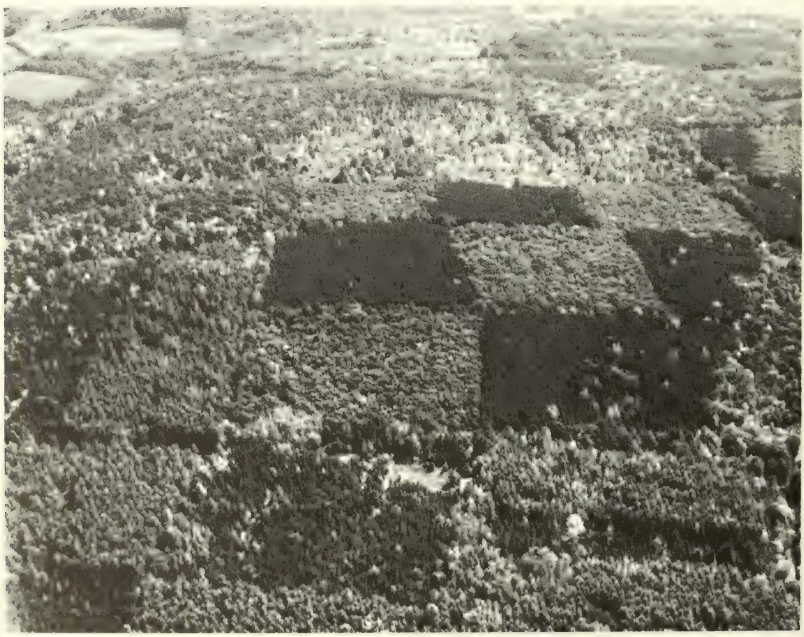


Figure 9.—Most of the larger plantations are found on State-owned land.

Poorly Stocked Stands Increased Greatly in Area

Nine percent of the commercial forest land area (1.3 million acres) is classified as nonstocked areas. Although 342,000 acres of such land were reported for 1950, abandoned farmland sufficiently stocked with seedlings and saplings at that time (but classified as nonforest) would have brought that total up to 995,000 acres. Even with the revised 1950 estimate, the acreage of nonstocked forest land has increased more than 30 percent.

Stand-size classifications are now based upon plurality of stocking, evaluated in terms of basal area and/or number of growing trees at each of 10 points against a standard of 75 square feet of basal area per acre. Stand-size classifications used on the initial survey were based upon volumes per acre. Acreages in these categories for 1950 and 1968 are not directly comparable.

One noticeable effect of the new classification procedure is that usually more sawtimber trees are found in stands classified as poletimber or sapling-seedling. Sapling-seedling stands, now totaling 6.1 million acres, more than doubled in area between surveys. This is due partly to definitions and partly to the large increase in commercial forest land.

Poletimber and sawtimber stands decreased in area—38 percent and 7 percent respectively—to 2.6 million acres for poletimber stands and 4.2 million acres for sawtimber stands. If timber stands on the resurvey had been classified on a board-foot volume-per-acre basis as was done on the initial survey, the sawtimber stand-size class acreage would have increased to 5.5 million acres.

Acreage of Softwood Types Increased 25 Percent

Forest type classifications are also based upon a plurality of stocking, but they are more comparable to those for the initial survey than stand-size class. Softwood types, as a whole, increased 25 percent during the period between surveys to 2.5 million acres. The largest increases were for the white pine and red pine forest types, which now totals 1.3 million acres (fig. 10). The spruce-fir forest type decreased about 5 percent.

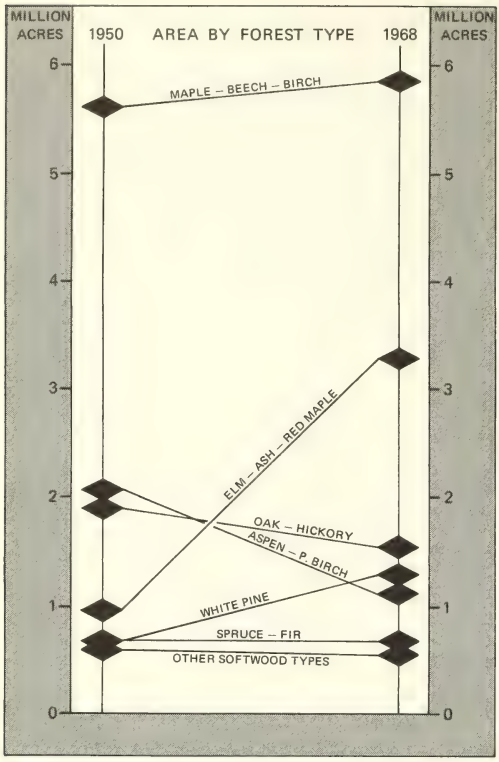


Figure 10. — The great increase in the elm-ash-red maple forest type was offset by decreases in the oak-hickory and aspen-paper birch types.

Hardwood forest types had an overall increase of 1.2 million acres, which brought the new totals to 11.8 million acres. The sugar maple-beech-yellow birch forest type, which made up 45 percent of the total forest area in 1950, increased 4 percent in area to 5.8 million acres, but now makes up 41 percent of the total forest area. The elm-ash-red maple forest type acreage more than tripled in size between surveys; however, this great increase was offset by decreases in the acreages of the oak-hickory and aspen-paper birch forest types.

Noncommercial Forest Land Area Also Increased

Forest lands in the Adirondack and Catskill Forest Preserve make up the bulk of the acreage classed as noncommercial, that is, productive forest land withdrawn from timber cutting and nonproductive forest land. The total area of the Forest Preserve

is about 2.6 million acres—made up of 2.2 million acres of productive forest land, 0.2 million acres of nonproductive forest land, and 0.2 million acres of water. Other noncommercial forest land outside the preserve totals about a quarter million acres.

Noncommercial forest-land area over the entire State increased almost 20 percent during the 18-year period to the present total of 2.9 million acres, including 0.4 million acres of unproductive forest land. Forest-land area in the Forest Preserve increased 9 percent, and noncommercial forest land outside the preserve increased 125 percent.

THE PICTURE OF CHANGE

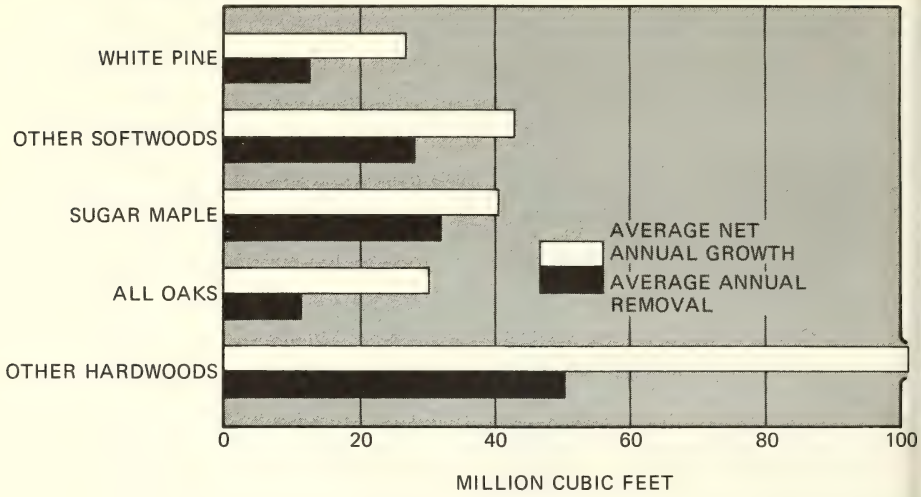
Timber volume increased 2 billion cubic feet during the 18-year period between surveys. This increase resulted from an average annual net growth of 245 million cubic feet and an average annual timber removal of 134 million cubic feet—an average annual change of +111 million cubic feet. These averages do not indicate whether the ratios of annual removal to annual growth are increasing or decreasing.

To more completely analyze the changes that took place, data from the inventory, net annual growth, timber removal, mortality, and current volume were compiled for several years, including 1967 (table 17). These computer-compiled estimates do not provide as much detail as is available from the average annual net-growth and average annual timber-removal estimates based upon the remeasured plots. In analyzing the change during the 18-year period, the data based upon averages for the period are presented first.

Average Annual Net Growth Exceeds Removal

Growing stock.—The average annual net growth of growing stock, including all species, was almost double the average annual removal. Hardwood growing stock made up about 70 percent of both the growth and removal. The annual growth of softwoods was 69 million cubic feet and the annual timber removal was 41 million cubic feet. For hardwoods, growth was

Figure 11.—Average annual net growth and removal of growing stock, 1950 to 1967.



176 million and removal was 93 million cubic feet. Most of the species had a much larger volume of growth than removal (fig. 11). The principal exceptions were yellow birch, sweet birch, and elm.

The volume of trees that grew to 5.0 inches d.b.h. or larger (ingrowth trees) during the 18-year period between measurements made up more than one-half (54 percent) of the average annual gross growth. However, in relation to the average annual net growth, the ingrowth trees accounted for almost 90 percent of the volume.

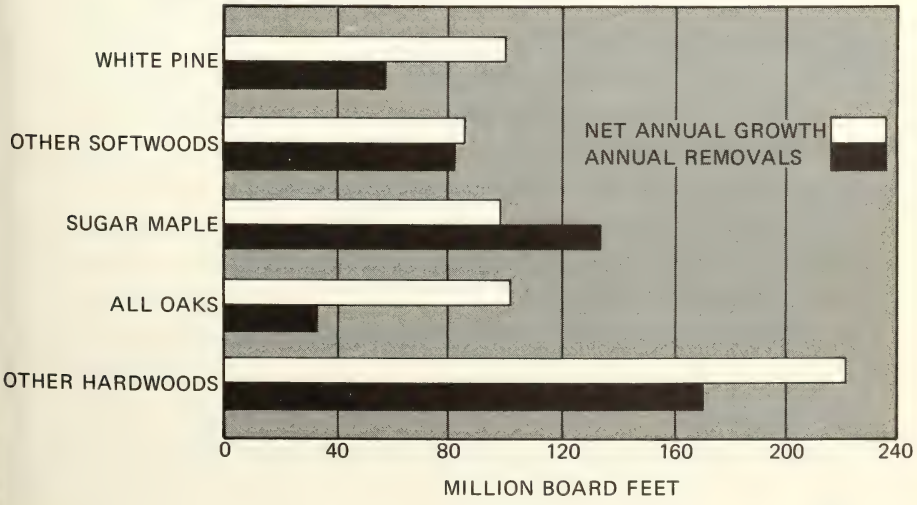
Two conditions were responsible for this unusually high percentage. Growing-stock mortality was severe (especially for elm). It reduced the average annual gross growth by 26 percent. Cull-tree increment (volume of trees classed as growing stock on the initial survey and now classed as rough or rotten trees) was also large; it reduced average annual gross growth by another 13 percent. Mortality and cull-tree increment together reduced the average annual gross growth by more than a third. The components of average annual change and their volumes are shown below:

Component	*Million cubic feet*	*Percent*
Growth on growing-stock trees	184	46
Volume and growth of trees that became poletimber	+219	+54
Average annual gross growth	403	100
Cull-tree increment	— 53	—13
Growing-stock mortality	—105	—26
Average annual net growth	245	61

Sawtimber.—Sawtimber growth averaged 606 million board feet per year, and sawtimber removal averaged 473 million board feet. The average annual removal of sawtimber volume is almost 80 percent as large as the volume of average annual net growth. Timber growth per acre per year on commercial forest land, excluding nonstocked areas, averaged 19 cubic feet, including 47 board feet of sawtimber.

Sawtimber-volume removal varied considerably by species in relationship to volume of growth. White pine sawtimber removal was 58 percent of the growth volume, but the sum of sawtimber removals for all other softwoods almost equaled the volume of their growth (fig. 12). Sugar maple sawtimber volume removal

Figure 12.—Average annual net growth and removal of sawtimber, 1950-1967.



exceeded the volume of growth by almost 35 percent, while the volume of sawtimber removal for all oaks was a little more than 30 percent of net annual growth.

High mortality of sawtimber trees and cull-tree increment reduced the average annual gross growth by more than one-fourth. As a result of this and the long period between surveys, the volume of trees that became sawtimber size—and their volume of additional growth—made up a very large portion of the average annual net growth: 80 percent. The components of average annual change and their volumes are shown below:

Component	*Million board feet*	*Percent*
Growth on sawtimber trees	344	42
Volume and growth of trees that became sawtimber	+ 483	+ 58
Average annual gross growth	827	100
Cull-tree increment	— 89	—11
Sawtimber mortality	—132	—16
Average annual net growth	606	73

Sawtimber removal exceeds growth in Northern Region.— On a statewide basis, the average annual timber removal of both growing stock and sawtimber was less than the average annual net volume of growth. But this situation is not uniform across the State. The timber-volume removal in the Northern Region was greater in relation to the volume of net annual growth than in the other two regions.

Growing-stock volume removal in the Northern Region was more than 75 percent of the net volume of growth, while in the Southwestern Region the removal was about 50 percent, and in the Southeastern Region about 30 percent.

Sawtimber-volume removal in the Northern Region exceeded the volume of net annual growth by about 7 percent; however, the softwood component in this removal exceeded growth by more than 25 percent (fig. 13). Although total sawtimber volume removal was less than the volume of annual growth in the Southwestern Region, the hardwood (mainly sugar maple) removal exceeded the volume of growth by more than 10 percent. In the

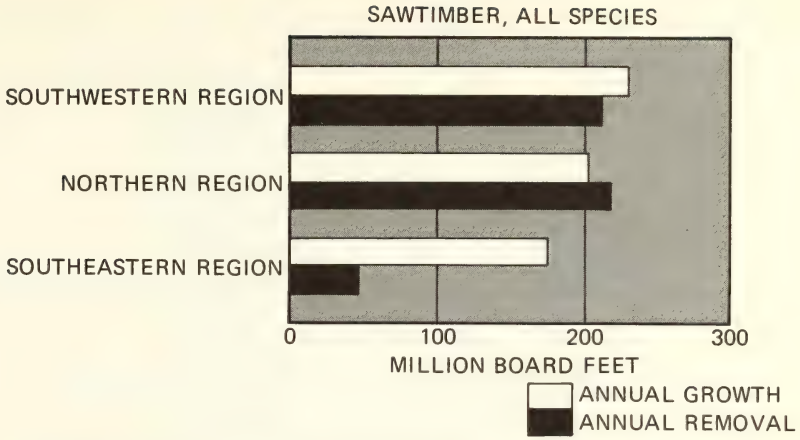


Figure 13.—Sawtimber average annual net growth exceeds volume of sawtimber removal in all but the Northern Region.

Southeastern Region, the volume of sawtimber removal was less than 30 percent of the volume of annual growth.

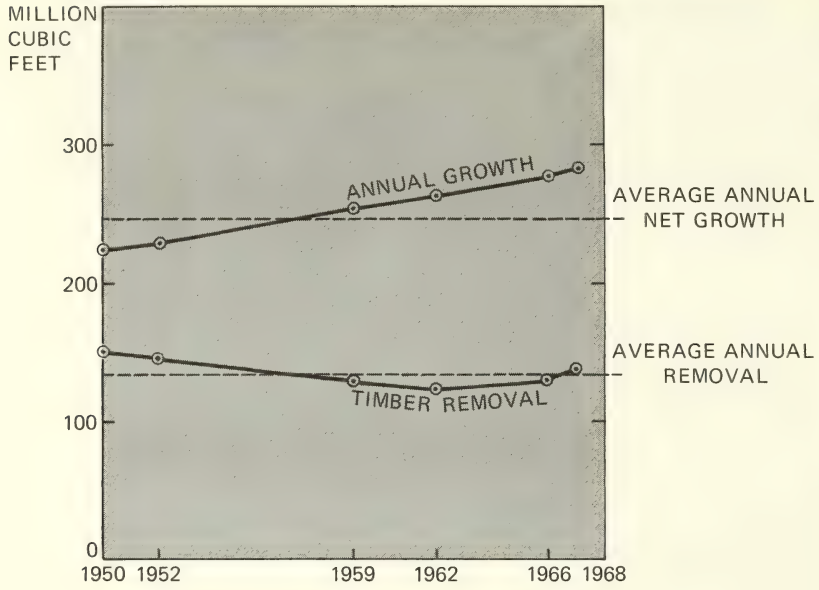
Annual Growth for 1967 Exceeds Removal

Growing stock.—The current net annual growth-removal relationship for 1967 is different from the relationship of average annual net growth to removal for the period between surveys. The ratio of net annual growth to removal of growing stock in 1967 was 2.1:1 as compared to 1.6:1 in 1952, and 1.8:1 for the entire period.

Net annual growth of growing stock for 1967 was 282 million cubic feet, or about 15 percent more than the average annual net growth for the period. Annual timber removal of growing stock decreased from the beginning of the period to about 125 million cubic feet in 1962 (fig. 14). Then the volume of timber removal began to increase, and in 1967 the removal reached 137 million cubic feet, or slightly more than the average for the 18-year period.

The picture is not the same when softwoods and hardwoods are looked at separately. Annual softwood growing-stock removal

Figure 14.—Considerably more timber can be cut before significantly changing the ratio of annual growth to removal.



was more than 85 percent of the net annual growth for 1952, but decreased to only one-third of the annual growth in 1967. However, hardwood timber removal was 55 percent of the net annual growth in 1967 as well as in 1952.

Sawtimber.—Sawtimber net annual growth and removal relationships are about the same as described for growing stock. The ratio of net annual growth to removal of sawtimber volume in 1967 was larger than that for 1952. These ratios were 1.4 : 1 and 1:1 : 1 respectively.

Net annual growth of sawtimber in 1967 was 656 million board feet—about 8 percent greater than the average annual net growth for the period. Annual sawtimber removal decreased during the first part of the period to about 426 million board feet in 1962. Annual removal then increased to 463 million board feet in 1967.

Interpreting the Picture

The utilization of the timber resource for fiber products has not kept pace with the increase in the forest inventory. Current

annual growth exceeds current removal in both board feet and cubic feet. Timber removal was higher in the early 1950's than now; but after reaching a low ebb in the early 1960's, removal is now on the increase. Annual growth probably will still be substantially greater than removal in the 1970's, even though the ratio between annual growth and removal may decrease. If the present trends continue, the inventory volume will continue to increase about 1 percent a year throughout the 1970's.

Timber Products Trends

A COMPREHENSIVE timber-products-removal survey based upon a 100-percent canvass of all New York's primary wood processors was made in 1968 by the Northeastern Forest Experiment Station and the New York State Conservation Department. The report on this survey showed that 101 million cubic feet of industrial roundwood (excluding fuelwood) were harvested from New York's forests in 1967. More detailed findings of this survey than are shown in this report are to be found in *Timber Products Production in New York, 1967* (*3*).

The timber-products-removal estimates for 1952 reported in the first timber resource report for New York (*1*) totaled 122 million cubic feet of industrial roundwood. In the 15-year period between timber-products-production surveys, the output of industrial products dropped 20 percent (24 million cubic feet).

An intermediate estimate of timber-products output based on reported lumber production and pulpwood production for 1962 was made by the Northeastern Station for *Timber Trends in the United States* (18). This estimate for 1962 showed that the production of industrial timber products dropped 28 million cubic feet to 94 million cubic feet in the 10-year period between the national compilations for 1952-53 and 1962-63.

The New York State Conservation Department and the State University College of Forestry conducted a cooperative study of industrial roundwood production and consumption for 1963-64 and published the results as average annual consumption for the 2-year period (*11*). That report showed that 89 million cubic

feet of industrial roundwood were cut in New York, of which 6 million feet were exported. This cut of 89 million cubic feet was 5 million less than the 1962 estimate.

Summarized below are the breakdowns of the above estimates of the industrial roundwood production, in millions of cubic feet:

Year	*Soft-woods*	*Hard-woods*	*Total*
1952	61.0	61.1	122.1
1962	30.1	64.2	94.3
1963-64	28.4	60.6	89.0
1967	22.2	75.7	97.9

For all species combined, there was a downward trend in industrial roundwood-products production from 1952 to 1964, and then a slight upsurge; however, for the softwood species, there was a continuing downward trend. The large increase in hardwood industrial roundwood-products production in 1967 was sufficient to make an overall increase in the production for all species.

EMPLOYMENT IN THE TIMBER-RELATED INDUSTRIES

Employment is reported by the Bureau of the Census for all major industries, by states. In New York State manufacturing accounted for about 30 percent of total employment in 1967; wholesale and retail trades accounted for about 20 percent; and the transportation, contract construction, and agricultural service industries accounted for about 10 percent. All these have some employment that can be attributed to timber. All other major industries (primarily services) accounted for about 40 percent of the total employment.

New York, in 1967, had a civilian work force[4] of 8.0 million persons out of the Bureau of the Census population estimate of 18.3 million people (*12*). This was a high-rate-of-employment year, with 7.7 million workers employed. The unemployment rate

[4] Civilian work force is defined by the U.S. Bureau of the Census as persons 14 years and older, outside the Armed Forces, and outside of institutions, who are working or looking for work.

was the lowest in many years—only 3.9 percent of the civilian work force.

Employment in New York State for 1967 in the major timber-related industries totaled nearly 1.4 million workers (table 91). The employment attributed to timber was estimated to be 318,500 employees, with total wages and salaries of about 2.0 billion dollars. This employment was mostly in the secondary manufacturing, construction, transportation and marketing activities, which made up about 90 percent of the total. One reason that this percentage is much greater than the 72 percent for the United States as a whole is that New York consumed ten times more industrial wood than was harvested within the State.

In the Timber-Supply Industry

The timber-supply industry includes only the employment involved in the managing and harvesting of logs and related products.

Forest-management employment includes forest protection and other related management activities. Part-time employment was converted to an equivalent full-time basis. Professional foresters made up about a tenth of the total employed. Total forest-management employment in New York for 1952 was estimated to be 1,000 employees (*1*). In 1954 forest-management employment was estimated to be 2,000 employees and in 1958 about 2,150 employees (*6*). The estimate for 1952 was probably too low, and there is no published estimate for any year since 1958. An estimate of about 3,000 employees for 1967 seems to be a reasonable one.

Employment in the harvesting of logs and related products is estimated to be about 8,000 employees, as derived from the 1954 and 1958 estimates (*7*). Total employment in the timber-supply industry for 1967 is estimated to be approximately 11,000 employees, with estimated earnings of more than 50 million dollars, all attributable to timber.

In the Timber-Based Manufacturing Industries

Timber-based manufacturing industries as discussed in this report include those that use raw material such as logs and bolts (primary manufacturing industries) and those that use products such as lumber, plywood, and paper (secondary manufacturing industries). The major industries are classified by the U. S. Bureau of the Census as follows: 24—Lumber and wood products; 25—Furniture and fixtures; and 26—Paper and allied products.

Employment in the manufacturing industries in New York State totaled 1.9 million workers, almost one-fourth of the total 1967 labor force. Employment in the timber-based manufacturing industries was 105,800 workers—15,300 in lumber and wood products (24), 23,500 in wood furniture and wood fixtures (25), and 67,000 in paper and allied products (26). Employment attributed to timber totaled 69,500 workers, or about 66 percent of the total employment in these three major industries.

Average weekly earnings in 1967 of those who worked in the timber-based industries were $112, an average of about $2.55 an hour. This is slightly below the average of $114 per week (at about $2.90 per hour) for all manufacturing industries in New York State. Weekly earnings of workers in the lumber and wood-products industries were considerably lower, on the average, than for the workers in the other two timber-based industries, as shown below:

Timber-based industry	*Average hourly earnings*	*Average weekly earnings*
Lumber and wood products	$ 2.29	$ 95.52
Furniture and fixtures	2.62	106.63
Paper and allied products	2.75	117.43
Total manufacturing industries	$ 2.89	$114.44

Employment in the timber-based manufacturing industries in New York for 1952 was estimated to be 105,000 workers (*1*). Although the total for 1967 was about the same, there were about 2,000 fewer employees in the lumber and wood-products industries and about 2,000 more employees in the paper and allied products industries.

Employment and annual earnings of those who worked in the timber-based manufacturing industries reported in *County Business Patterns* (*17*) were used to derive estimates for breakdowns of totals in the *New York State Statistical Yearbook* (*12*).

The employment in the timber-based manufacturing industries was greater in the metropolitan area than in any of the other three regions as shown below:

Region	*Number of employees (thousands)*	*Earnings (million dollars)*
Southwestern	28.0	42.7
Northern	15.5	24.3
Southeastern	14.8	23.7
Metropolitan	47.5	69.7
State	105.8	160.4

In Other Timber-Based Industries

These industries include construction, transportation, and marketing. Construction embraces all activities involved in the fabrication of lumber, plywood, and other products into buildings and other fixed structures. Transportation and marketing includes all activities involved in the transportation of logs and related products from local points of delivery to manufacturing plants or consumers, transportation of primary and secondary products from points of manufacture to final consumers, and the marketing of these products through wholesale and retail channels.

Total employment in these three industries in 1967 amounted to 1.0 million workers. About one-fifth (200,000) of this employment was attributed to timber. These industries accounted for roughly two-thirds of the employment attributed to timber for all the timber-related industries.

OUTPUT OF THE PRIMARY MANUFACTURING INDUSTRIES

Primary wood-using manufacturing plants are defined as those that use logs or bolts as raw materials. The most important ones are the sawmills, pulpmills, and veneer plants. These are classified by the U.S. Bureau of the Census (*17*) as follows:

Code	*Industry*
242	Sawmills and planing mills
2432	Veneer and plywood plants
261	Pulpmills
262	Paper mills, except building paper
263	Paperboard mills

A complete list of codes for all industries that use wood in one form or another is shown in table 90.

Output of roundwood products in 1967 totaled 133.4 million cubic feet, about 80 percent of it from the hardwood species. Industrial roundwood products made up almost three-fourths (97.9 million cubic feet) of the total. Fuelwood made up the other fourth. In addition to the volume of roundwood products produced, 16.7 million cubic feet of plant byproducts were also utilized for fuelwood, pulpwood, and miscellaneous products.

Production of sawlogs, veneer logs, and pulpwood bolts accounted for 93 percent (91.0 million cubic feet) of the total output of industrial roundwood products from New York's forests in 1967. Poles, posts, and other miscellaneous products accounted for the remaining 7 percent.

The 1967 lumber production came from 302 sawmills scattered throughout the State (fig. 15). More than one-third of the saw-

Figure 15.—This sawmill in northern New York has been operating continuously for more than 60 years.

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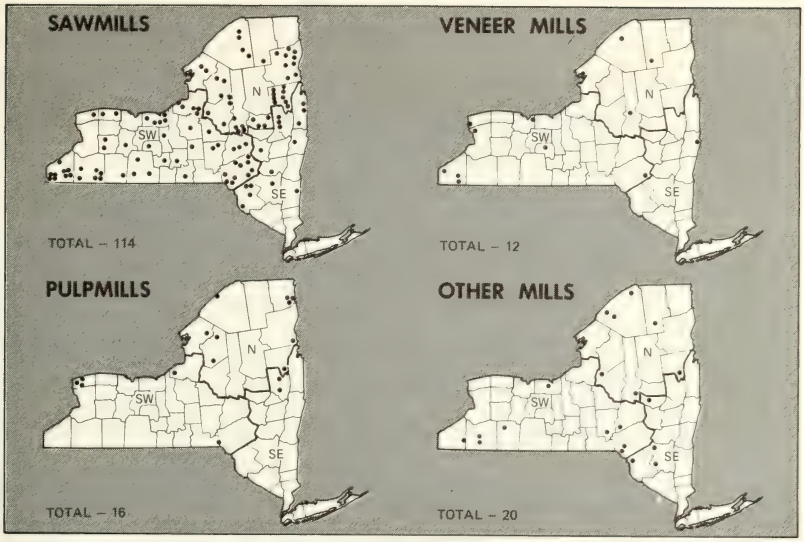

Figure 16.—Primary wood-using mills and plants in New York, 1967, by county and region. The sawmills shown are only those that produced more than 1 million board feet in 1967. The other mills include splitting, bolter, and ladder mills (9), handle mills (5), post and pole plants (4), and flakeboard and excelsior plants (2).

mills have a capacity of 1 million or more board feet of production per year (fig. 16). Most of the larger mills are in the Southwestern Region.

Sawlog Production Is Down from 1952

Many small sawmills have gone out of production, mostly because of increasing costs and decreasing timber quality (*3*). In 1952, because of the high wartime lumber consumption, about 1,500 sawmills were operating in New York. By 1967 this number had dropped to 300 operating sawmills. Sawlog production dropped from 484 million board feet in 1952 to 353 million in 1967, a decrease of about 27 percent. This decrease in production is not as severe as it may seem, because the production of timber products in 1952 was abnormally greater than in 1950 due primarily to timber-salvage operations after the 1950 hurricane.

Figure 17.—White pine and hemlock sawlogs like these accounted for a fifth of the 1967 sawlog production.

NEW YORK CONSERVATION DEP. PHOTO

About one-fifth of the sawlog production came from softwood species, principally white pine and hemlock (fig. 17). Most of the softwood production was in the Northern and Southwestern Regions. The other four-fifths of the sawlog production came from hardwood species, of which sugar maple sawtimber volume ranked first. The Southwestern Region produced about one-half of the sawlog output for the State as shown below, in millions of board feet:

Region	*Softwoods*	*Hardwoods*	*Total*
Southwestern	14.5	151.0	165.5
Northern	37.0	102.5	139.5
Southeastern	12.0	36.4	48.4
State	63.5	289.9	353.4

In addition to the volume of sawlogs produced from New York's timber supply and sawed into lumber by local sawmills, about 12.6 million board feet of sawlogs were brought into the State. Adjacent states drew upon New York's forests for 8.6 million board feet of sawlogs to help supply their own sawmills.

Roundwood Pulpwood Production Is Down Slightly

Pulpwood cut within the State in 1967 supplied its 16 pulpmills with 394 thousand cords of roundwood as compared to the 411 thousand cords supplied to about twice that number of pulpmills in 1952 (fig. 18). One-third of the 1967 production was from the softwood species—74 thousand cords of spruce and fir, 42 thousand cords of pine, and 16 thousand cords of other softwoods (*8*). In 1952 softwoods made up 85 percent of the pulpwood produced. The hardwood pulpwood production in 1967 totaled 262 thousand cords and was made up of 14 thousand cords of aspen and yellow-poplar, 14 thousand cords of oaks and hickory, and 234 thousand cords of other hardwoods, principally the maples, birches, elm, and beech.

Nine of the 16 pulpmills are located in the Northern Region of the State. Seventy percent of the pulpwood was produced in this Northern Region. Softwoods made up only 11 percent of the pulpwood production in the Southeastern Region and 44

Figure 18.—Debarked pulpwood ready for delivery to one of the 16 pulpmills in New York.

New York Conservation Dep. Photo

percent in the Southwestern Region as indicated by the following data, in thousands of cords:

Region	*Softwoods*	*Hardwoods*	*Total*
Southwestern	26.0	32.7	58.7
Northern	100.1	174.7	274.8
Southeastern	6.5	54.3	60.8
State	132.6	261.7	394.3

Total output of pulpwood in 1967 amounted to 463 thousand cords, including 69 thousand cords from plant byproducts (cordwood equivalent of 5.5 million cubic feet from this source) (fig. 19). The pulpwood production from plant byproducts in 1952 was only 2,600 cords, making the total output of pulpwood volume 413 thousand cords, about 50,000 cords less than in 1967.

A small part of the pulpwood production, 4,600 cords, was used by out-of-state pulpmills. A much larger volume—188

Figure 19.—About 15 percent of the pulpwood volume came from mill byproducts like these slabs and edgings.

NEW YORK CONSERVATION DEP. PHOTO

thousand cords—was brought in from other states and Canada to meet the annual needs of New York's pulpmills. Pulpwood receipts from within the State made up only 27 percent of the total in 1950 (*1*), 40 percent in 1952, and 67 percent in 1967. If this trend holds for the next 10 years, New York's forests should provide 75 percent of the pulpwood volume needed by the pulpmills in 1977.

Veneer Log and Bolt Production Increased

Veneer log and bolt production for 1967 was 22.1 million board feet (all of it hardwood). This was an increase of 3 million board feet over the production for 1952 even though the number of veneer mills decreased from 29 to 12. Veneer mills producing basket veneer decreased from 14 to only 3 in 1967. Veneer mills producing face veneer for plywood decreased from 15 to 9. Eight of the State's veneer mills are located in the Southwestern Region.

In addition to the veneer logs and bolts produced within the State, about 3.2 million board feet of such raw material was brought in from other states. About 1.5 million board feet of veneer logs and bolts were shipped out of the State. The net effect of these movements was that 23.7 million board feet were used by the veneer mills in New York State in 1967.

Veneer log and bolt production came principally from 15 hardwood species, yellow birch making up more than one-fifth of the total (4.8 million board feet) (*3*). The principal species and their ranking according to volume of production are listed below, in million board feet:

Species	*Log and bolt production*	*Percent*
Yellow birch	4.8	22
Elm	3.4	15
Red oak	3.4	15
Hard maple	3.1	14
Black oak	2.1	10
Beech	1.8	8
Basswood	1.1	5
Other hardwoods	2.4	11
All species	22.1	100

Output of Other Primary Wood Products Decreased

Production in the less important primary wood-using manufacturing industries—poles, posts, and bolts for other products—accounted for 7 percent (6.9 million cubic feet) of the output of industrial roundwood products. This 1967 output was 0.8 million cubic feet less than the output in 1952. Hardwoods made up 92 percent of the volume used for these minor products (fig. 20). Softwoods made up the other 8 percent, used mainly for poles and posts.

Scattered throughout the State are 20 mills or primary plants that process the raw material for the various products shown below:

Kind of mill or plant	*Number of mills or plants*
Splitting, bolter, ladder, and bats	9
Handle	5
Post and pole (only the largest plants)	4
Flakeboard and excelsior	2

Figure 20.—One of the minor products: white birch bolts being sawed into turning squares.

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One kind of mill included in the first class shown above manufactures baseball bats. Classified as sporting and athletic goods manufacturing, this industry in New York in 1954 used about 12.7 million board feet of lumber, logs, and bolts, of which 10.2 million board feet came from within the State (*4*). White ash made up 43 percent, hard maple 57 percent, and other species less than 1 percent of the volume used. Products manufactured include baseball bats (from ash) and bowling pins (from hard maple), which accounted for 85 percent of the volume used; and other products—such as tennis rackets, skis, and hockey sticks—accounted for 15 percent.

Baseball bats require high-quality ash. Ash logs are sawed into 40-inch bolts. The best bolts are split and the pieces are rough-turned into billets 3⅛ inch in diameter (fig. 21). These rough-turned and sawed billets (2½ inches square) are seasoned and then turned into baseball bats. A major league baseball team will use about 400 bats a year, but many thousands of bats are given away. For example, the New York Yankees gives away an average of 60,000 Little League baseball bats a year.

VALUES ADDED BY INDUSTRIES

Value added is the difference between the cost of goods purchased and the value of products sold. The sum of values added attributed to timber is considered to represent that part of the gross national product originating in timber-based economic activities.

The economic importance of timber is much greater in the secondary-manufacturing, construction, and transportation and marketing industries than in the primary manufacturing industries. Dwight Hair pointed out that, in 1958, timber in the United States increased in value 25 times between the stump and the delivery of finished products (*6*). The total value added to $1 worth of stumpage cut through the harvesting and primary manufacturing phase was $5.35; and through the secondary-manufacturing, construction, and transportation and marketing phase, $18.40 more was added. However, in New York the industries

Figure 21.—High-quality white ash is required for making baseball bats. A, logs are sawed into 40-inch bolts. B, the bolts are split for rough turning. C, bat billets ready for kiln-drying. D, Bat Day at Yankee Stadium.

Bob Olen Photo

in the latter groups are far less dependent on the State's timber resource than the primary manufacturing industries are.

Secondary manufacturing, construction, and transportation and marketing industries in New York State employed in 1967 the equivalent of 1.3 million employees, of which the employment of 290,000 was attributed to timber. The value added to the annual gross national product attributed to timber in these industries totaled about 2.9 billion dollars, or about 10,000 dollars per employee. Each of the above three industries accounted for roughly one-third of the value added as shown below:

	Value added attributed to timber	
	(*thousand dollars*)	(*percent*)
Secondary manufacturing	999,300	34
Construction	858,000	29
Transportation and marketing	1,083,000	37
Total	2,940,300	100

Secondary Manufacturing Industries

Intermediate products such as dissolving grade of woodpulp, much of the paper and paperboard, and substantial quantities of lumber, veneer, and plywood are further manufactured into containers, furniture, wearing apparel (rayon), and other consumer goods. The estimate of value added attributed to timber in six secondary manufacturing industries was based primarily on the cost of timber products consumed. This in turn was related to employment and employment attributed to timber.

Value added attributed to timber in the selected secondary manufacturing industries in New York for 1967 totaled 999 million dollars. This estimate is based upon employment as given in *County Business Patterns* (*17*), employment attributable to timber by Dwight Hair (*6*), and values added as given in the *Statistical Abstract* (*15*). Value added by manufacture increased 45 percent in the 15-year period between 1952 and 1967.

The manufacturing industry codes used by the Bureau of the Census are shown for the major timber-based industries in table 90.

The paper and paperboard industry accounted for more than one-half ($504 million) of the total value added attributed to timber for the six industry groups. The value added attributed to timber in the fibers, plastics, and textile industries ranked second, with $343 million, and made up more than one-third of the total. Values added attributed to timber per employee ranged from $7,100 in the wooden containers industry to $14,300 in the paper and paperboard industry as shown below:

Secondary-Manufacturing Industry	Value added attributed to timber	
	Total (*$1,000*)	*Dollars per employee*
Paper and paperboard products	503,930	14,251
Selected industries for fibers, plastics, and textiles	343,109	8,623
Furniture and fixtures, excluding those of metal	79,817	9,294
Millwork and prefabricated wood products	26,231	9,108
Wooden containers	6,653	7,063
All other wood-using industries	39,609	8,935
Total	999,349	10,863

The Construction Industry

It has been estimated that 100 percent of all the poles and piling, about 75 percent of all lumber and softwood plywood, 10 percent of the paper and paperboard, and significant quantities of other timber products in the United States are used in the construction industry (*6*).

Construction includes the erection and maintenance of structures such as buildings, docks, bridges, railways, and utilities such as electric power lines, telephone lines, and sewers. Expenditures for new construction make up about three-fourths and repairs make up one-fourth of the total spent on construction (*15*).

Construction contracts for new construction in New York State for 1967 was reported to be 3.9 billion dollars, but this was increased to 5.2 billion dollars for total construction, using the same ratio as for the United States total (*15*). Expenditures for construction include the cost of brick, concrete, steel, and other intermediate products purchased from other sectors of the economy. These costs represented about 43 percent of the total expenditures in 1958 and were deducted to get value added in construction.

For the construction industry there are no published Bureau of the Census data on value added. Estimates of total value added were derived by Hair (*6*) from the limited data available. The estimates are less accurate than for the secondary manufacturing

industries and are subject to a considerable margin of error because of gaps in the data on employment and the indirect method used in computing value added.

Lumber, plywood, and building board accounted for about 20 percent of the cost of materials used in construction in 1958. It was assumed that the value added attributed to timber could be allocated in proportion to cost of materials used. In New York State the derived value added attributed to timber was 16.5 percent of the combined value of new construction and maintenance and repair in 1958. This percentage was applied to the estimated combined value for construction and maintenance for 1967 (*15*). The value added attributed to timber was estimated to be 858 million dollars, an increase of 7 percent over the corresponding value for 1958.

The Transportation And Marketing Industries

Transportation of raw materials such as logs and related products from local points of delivery to manufacturing plants or consumers, transportation of manufactured products from plants to consumers, and the marketing of these products through wholesale and retail channels make up the transportation and marketing industry. For these industries, as well as for the construction industry, there were no Bureau of the Census data on value added.

Total value added attributed to timber in the transportation and marketing industry in New York was 1.1 billion dollars in 1967—42 percent of this in the wholesale trade, 36 percent in the retail trade, and 22 percent in transportation. Only relatively small parts of the economic activities in transportation and marketing were based on timber products. These products accounted for about 5 percent of the total freight revenue in water transportation, 10 percent in motor-truck transportation, and 13 percent in railroad transportation. Sales of timber products accounted for 6 percent of the wholesale trade and 4 percent of the retail trade total sales (*6*).

Data on operating revenues for the transportation industry

were not yet available for 1967, but such data from previous years were used to calculate an average annual increase in operating revenues (*15*). The annual rate of increase attributed to timber in this industry was 4.3 percent. The value added attributed to timber in the transportation industry in 1958 increased 39 percent to 238 million dollars in 1967.

Retail trade sales increased 56 percent, and wholesale trade sales increased 67 percent between 1958 and 1967 (*15*). Assuming that the value added attributed to timber in these industries increased at the same rates, the estimates of value added attributed to timber in the wholesale trade in 1967 is 449 million dollars and in the retail trade is 396 million dollars.

DEMAND VERSUS SUPPLY

Population in New York State increased 20 percent since 1952, to 18.3 million people in 1967 (*15*). By coincidence, New York's timber supply kept pace with the population and also increased 20 percent. However, per-capita industrial roundwood consumption (based upon national data) dropped about 10 percent to the equivalent of 59 cubic feet (*7*).

People in New York State consumed the equivalent of 1.1 billion cubic feet of industrial roundwood in 1967. This is more than ten times greater than the output of industrial products (101 million cubic feet) from the forests within the State. The consumption was in the form of new house construction, furniture, newspapers, and other commodities that are of wood or partially made from wood.

Primary wood-using manufacturing industries get most of their roundwood supply from within the State—97 percent of the sawlogs, 86 percent of the veneer logs and bolts, 67 percent of the pulpwood bolts, and about 100 percent of the other industrial wood. The secondary wood-using manufacturing, construction, and transportation and marketing industries depend mainly on out-of-state timber products such as lumber, plywood, and veneer.

More than one-half of the total wood consumed by industries in New York originated as sawlogs. One-third of the consumption originated as pulpwood bolts, and about 15 percent originated

as veneer logs and other wood products. The volume equivalent for this industrial roundwood consumption is shown below:

	Volume (million cubic feet)
Sawlogs	569
Pulpwood bolts	357
Veneer logs	108
Other	46
Total	1,080

Seventy percent of the wood consumption in New York State was from the softwood species—in sharp contrast to the softwood component of the forest inventory volume, in which softwoods made up 26 percent of the total.

One primary wood-using industry of particular interest in New York State is the paper and paperboard mills, which numbered 102 in 1952 and produced 1.7 million tons of paper and paperboard that year. Some have gone out of production. In 1967 *County Business Patterns for New York* (17) showed 74 such mills, and it was estimated that they produced 2.0 million tons in 1967.

Newsprint in 1952 made up at most only 223,000 tons of the paper produced within the State. This is less than 60 percent of the yearly tonnage required by the New York Times alone, which used 384,000 tons in 1968 (fig. 22). Most of the newsprint

Figure 22.—Rolls of newsprint—some of the 8,500 rolls used per week by The New York Times—ready to go into the presses.

NEW YORK TIMES PHOTO

needed by the 507 newspapers in the State is purchased from paper mills in Maine and Canada and other countries. No newsprint has been produced in New York State since 1957.

The Future Timber Supply

TIMBER SUPPLY OUTLOOK

THE ESTIMATES compiled for the initial survey and the resurvey make it obvious that the inventory of timber in New York State will increase considerably unless an unforeseen large increase in timber removal takes place. The average net annual growth of growing stock between surveys was 246 million cubic feet while the average annual removal was only 134 million cubic feet.

The uncertainties of the future can upset long-range predictions of timber cut and associated estimates of timber growth and inventory, unless the assumptions that are made hold true for the entire period. Regardless of the assumptions we make, it appears that timber can be cut at a much higher rate than it was cut between surveys, especially in the 10-year period ending in 1978.

The following assumptions were made: (1) farmland will be abandoned at a decreasing rate, and the acreage that reverts to forest land will be about equal to the acreage of forest land converted to nonforest by land clearing; (2) growth rates based upon the average net annual growth between surveys will continue to be the same for the next 30 years; and (3) trends in forestry programs such as those under the New York Forest Practice Act of 1946 (*13*) will continue at the same rate as in the past.

Timber available for cutting can be assumed to be that amount that will bring net annual growth and timber removal from the present inventory into balance at the end of 30 years (fig. 23). The growing-stock inventory volume will level off at about 14.5 billion cubic feet. From the curve of past and future timber removal and the projection ahead for 30 years, the following

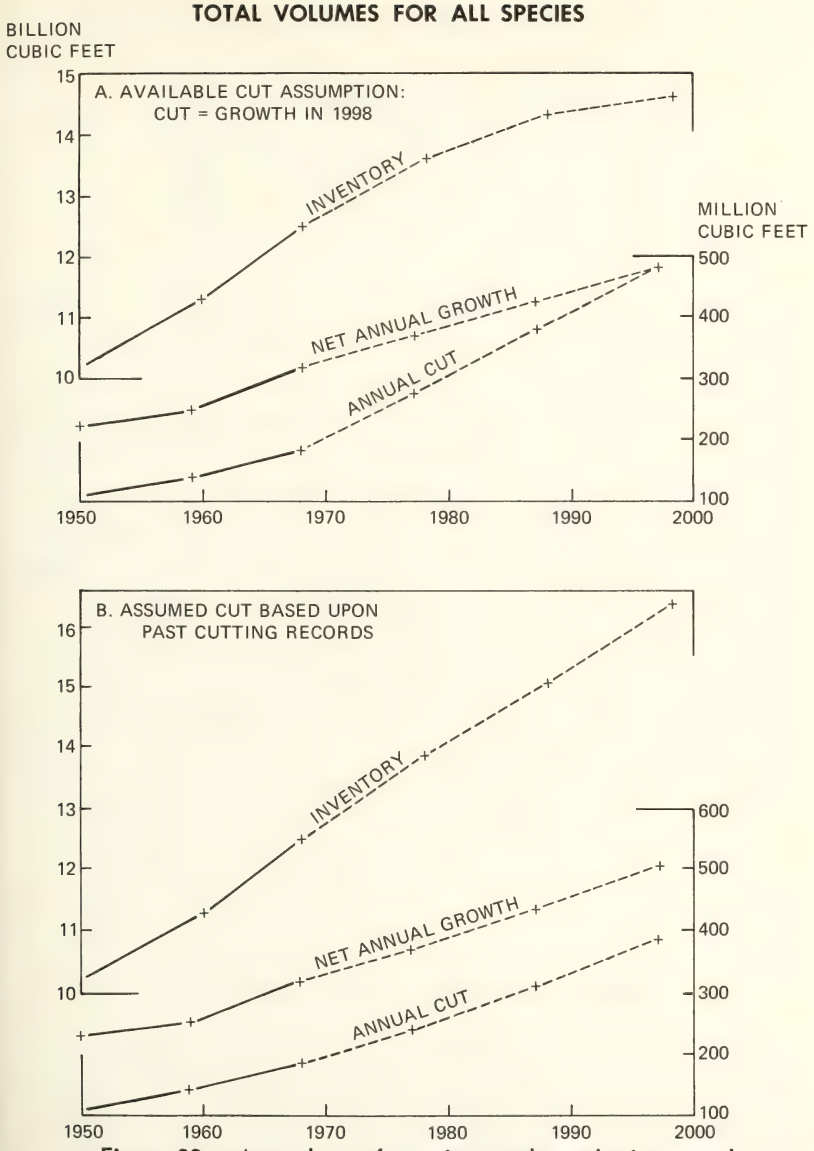

Figure 23.—Annual cut of growing stock can be increased without decreasing the inventory.

tabulation shows for specified years the annual growth and the available cut, in millions of cubic feet:

Year	*Annual growth*	*Available cut*
1968	321	185
1978	371	276
1988	427	379
1998	478	478

Unless timber cutting is greatly accelerated, net annual growth and annual removal will not come into balance at the end of the 30-year period. If we assume that hardwoods will continue to be cut at the same rate and that softwoods will be cut at a faster rate than in the past, the inventory in 1999 will be more than 16 billion cubic feet. The assumption for the increased cut of softwoods is based upon data that show that the estimate of timber removals for 1967 is greater than for 1964 even though the trend curve sloped downward from 1952 to 1967.

Sawtimber projections, based upon cutting rates to bring and hold the cut of growing stock to about 478 million cubic feet by 1998, show that the board-foot volume inventory will increase slowly for the next 10 years but will decrease for the rest of the period to about 20 billion board feet. However, if the present rate of cutting continues, the board-foot volume inventory will increase for the next 20 years and then decrease slightly to 24.5 billion board feet in 1999.

MANAGEMENT OPPORTUNITIES

Armstrong and Bjorkbom stated in the first timber-resource report for New York (*1*) that land rehabilitation was one major problem and that rehabilitation of the timber resource was the other major problem. The findings of the resurvey show that the same problems exist, and they can be restated as follows: (1) the stocking of growing-stock trees is inadequate over much of the forest area, (2) the stocking of desirable trees is extremely poor, and (3) timber quality is becoming worse.

Large acreages of farmland are being abandoned each year as crops fail to bring in sufficient financial returns for the owners.

If abandoned or idle cropland is near a tree seed source, the land will revert to a forest tree cover in time. If the seed source is inadequate, future income from timber products may be delayed for an unreasonably long time. The problem is how to bring this kind of land back into forest productivity within a reasonable time for the benefit of the owner and the community.

An estimate independent of the forest-survey estimate of nonstocked forest land can be derived from the Censuses of Agriculture. The 1949 Census of Agriculture for New York reported 125,000 farms in the State (*14*). These farms had 8.5 million acres of cropland and 3.1 million of pasture (excluding cropland and woodland used for pasture). Together they made up 11.6 million acres of open land. Decreases between censuses in the number of farms and in open-land acreage are shown below:

	Number of farms	*Thousand acres*
1949-54	19,300	682.5
1954-59	23,400	1,341.6
1959-64	15,800	814.7
15-year decrease	58,500	2,838.8

Based upon the Census of Agriculture data alone, there are probably more than a million acres of idle or abandoned cropland that will not produce revenue for years to come.

Tree Stocking Is Inadequate On One-Third of the Area

The forest-survey data for 1968 show that 1.3 million acres of forest land are nonstocked and 3.8 million acres of forest land are poorly stocked. Nonstocked forest land had increased 0.3 million acres and poorly stocked forest land had increased 3.0 million acres between surveys. Probably much of the increase came from the abandoned farm cropland. However, this large increase in acreage of nonstocked and poorly stocked forest land emphasizes the problem of inadequate stocking on forest land.

Private individuals and businesses own a total of 1.2 million acres of forest land that are nonstocked. Public ownerships (mostly state) account for more than 70,000 acres of nonstocked forest land, of which 5,000 acres are estimated to be plantable.

Some of this publicly owned forest land will probably be planted as funds are made available. But the bigger concern is for the acreage of nonstocked privately owned forest land, which is 17 times greater than the publicly owned land.

Extensive areas of state-owned submarginal farmland acquired under authorization by a state constitutional amendment were planted between 1931 and 1952—the equivalent of 285,000 acres (*1*). About 179,000 more acres of plantations were established on private land. County and municipal lands totaling 68,000 acres were also planted. More than 500,000 acres of plantations were established between 1902 (when the first forest tree nursery was established by the State) and 1952. Our resurvey recognized timber stands that originated as plantations; and the total acreage of existing plantations is now estimated to be 564,000 acres. Although the acreage of plantations in New York State may seem large, it is much less than the acreage of open farmland in New York that has been abandoned, for any 5-year period between recent censuses of agriculture.

The New York State Conservation Department now has two tree nurseries to provide seedlings to landowners for planting their idle land. In recent years most of the planting in the State has been on private land. Although planting varies from year to year, an average of about 20,000 acres are being planted to seedlings each year. The trend is toward wider spacing between planted seedlings, such as 8 by 8 feet (*16*). This reduces initial costs, but requires weevil control (for white pine), properly timed pruning, and probably some thinning to produce quality pine.

Hand-planting of seedlings can be done at a rate of about 800 seedlings per man-day, depending upon soil conditions, location, and presence of other growth. Hand-planting is the only means of planting some areas such as steep and rocky slopes. Much of the land that had formerly been cultivated for crops is suitable for machine-planting of seedlings. Machine-planting is a more economical method and costs about 20 to 25 dollars per acre. Up to 10,000 seedlings can be machine-planted per day under favorable ground conditions (*16*).

Desirable Tree Stocking Is Extremely Poor

Only 1 percent of the commercial forest land (150,000 acres) in New York State is 40 percent or more stocked (medium stocking) with desirable trees that are defined as vigorous trees that have no serious defects in quality (fig. 24). (See Appendix for complete definition of desirable trees.) Nearly 20 percent of the forest land (2.8 million acres) is 10 to 40 percent stocked (poorly stocked) with desirable trees. The remaining 80 percent (11.4 million acres) is less than 10 percent stocked with desirable trees.

About one-fifth (2.7 million acres)of the forest land that is less than 40 percent stocked (poorly stocked) with desirable trees is fully stocked with growing-stock trees. The areas of forest land that are both poorly stocked with desirable trees

Figure 24.—Good stocking of desirable trees such as these was found on only 1 percent of the commercial forest land area.

NEW YORK CONSERVATION DEP. PHOTO

and poorly stocked with growing-stock trees make up more than one-third (5.1 million acres) of the commercial forest land.

Past cutting operations have downgraded the growing stock in New York State. Most of the old-growth stands to be managed as an uneven-aged forest need a thorough renovating when management is started. Because there are so many poor growing-stock trees, the first cut (primarily for presalvage and improvement) should be moderately heavy—a cut of 25 to 40 percent of the gross volume in trees 5.0 inches d.b.h. and larger (*5*). Rough and rotten trees and wolf trees should be removed at the time of the cutting or immediately after by felling, girdling, or treating with silvicides. The single-tree selection system of cutting will perpetuate or increase the proportions of the very tolerant species —sugar maple, beech, hemlock, and red spruce.

Timber Quality is Decreasing

About every fourth tree (5.0 inches d.b.h. and larger) in the average timber stand is either too rough or too rotten to be classed as a growing-stock tree. Scattered throughout the forests are 83 million softwood trees and 418 million hardwood trees that cannot be classed as growing stock. These trees account for more than 15 percent of the sound-wood volume of all live trees on commercial forest land. They compete for growing space and lower the potential yield of usable timber per acre.

Timber quality in sawtimber trees—as expressed by standard-lumber log grades—is generally poor. Sawtimber trees have a relatively small volume in grade-1 sawlogs. Less than 2 percent of the pine board-foot volume falls into grade 1, which is about the same as for the initial forest survey. Nearly 15 percent of the hardwood board-foot volume falls into grade 1. In 1950 almost 30 percent of the hardwood volume was classified in this grade. Timber-stand improvement is needed to reverse this downward trend for hardwoods and to increase the quality of softwoods.

Timber-stand improvement can start in young stands of timber. Cleanings should begin when the trees are head high, no more than 10 years of age; thinnings should begin as soon as crop trees can be recognized (*5*). Cleaning is an operation in which

the undesirable members of sapling-and-seedling stands are removed, such as unmerchantable or low-value species, forked or crooked trees, and stump sprouts. Tree thinning is the removal of only the trees that are interfering with the crown development of the crop trees.

White pine and red pine timber quality can be improved by artificial pruning at an early age (*16*). Considerable research has been done in the pruning of white pine and has resulted in the following important guides: (1) for quality growth alone, frequent light prunings are preferred over a single heavy pruning; (2) between one-third and one-half of the live crown can safely be removed in pruning without loss of growth, provided this leaves a live crown at least one-third of the total stem length; (3) pruning should be done in the dormant season for best healing; (4) live branches over 2 inches in diameter should not be pruned because of the high cost and slow healing rate; (5) trees usually should not be pruned higher than the first sawlog (17 feet) because of the greater cost; and (6) the number of trees to be pruned should at least equal the number expected to make up the stand when mature.

Most Landowners Show Interest in Their Woodlands

One of the principal findings of a recent ownership study revealed that owners of about 80 percent of the commercial forest land in the State have some kind of interest in the management of their woodland for timber products. This study, which was tied into the forest-survey field plots throughout the State, was made in 1967 and 1968 to shed some light on owners' attitudes about their forest land.

Personal interviews were made with 350 landowners. They were chosen at random from 4,834 forest sample plots. The findings showed that 14 percent of the commercial forest land is owned by retired people and that about one-third of the forestland acreage was acquired with other property for permanent or part-time residence.

Other findings of this study showed that owners of more than

20 percent of the commercial forest-land area in the State had no interest, or were indifferent, at time of purchase as to whether part of the property was forested. Owners of another 20 percent of the forest land were interested in selling timber products. Another group of owners, holding 18 percent of the forest land, were interested in timber products for home use. Owners of the remaining 40 percent of commercial forest land were more interested in other uses for their forest land—such as scenic values, hunting, other outdoor activities, and wildlife production and protection.

The owners were questioned about their preference of a method for selecting trees to be cut from their land. Owners of about two-thirds of the commercial forest land in the State preferred individual-tree selection, in which trees to be cut are selected and marked by the owner or his agent. The implication from this finding is that considerably more forest acreage could be brought into the cooperative program of the Forest Practice Act (*13*).

In summary, it appears that owners who together possess more than three-fourths of the commercial forest land in the State are interested in forest management and that most of these owners prefer their trees to be selected and marked before cutting. These landowners include cooperators or potential cooperators with the New York State Conservation Department under the terms of the Forest Practice Act.

The Forest Practice Act Sets Minimum Standards

The New York State Conservation Department has long recognized that landowners need help in forest management. At first the Department established a tree nursery to provide the means for re-establishing forests on idle land. Forest protection from fires, insects, and disease was needed; and the Department initiated control over them.

In 1946 the Forest Practice Act was enacted into law by the State. This Act provides for: (1) the setting up of definite standards for the practice of forestry on privately owned wood-

lands in the State; and (2) assistance from the State Conservation Department in carrying out these practices. The purpose of this voluntary cooperative program is to encourage forest landowners to weed, thin, or prune their timber stands to produce timber of better quality and to harvest their timber according to good forest practices.

More than 1 million acres of forest land owned by about 5,000 persons were being managed in 1952 under the Forest Practice Act. In 1968, the forest area under management had enlarged to 1.8 million acres, owned by about 9,500 cooperators.

Any woodland owner who becomes a cooperator agrees to comply with thirteen basic principles of the Forest Practice Act applicable to existing woodlands and nonforest lands for planting, protection, and harvesting. In addition to the basic principles, this Act gives the minimum cutting practice standards—based upon age, site, quality, and condition of the stand.

Under the terms of the Forest Practice Act, 14 operational forest districts were created in the State. A technically trained forester (a district director, Division of Lands and Forests) is in charge of each forest district. He is responsible for the forestry activities in his district, and he directs the service work for woodland owners within his district.

The services to the woodland owner include but are not limited to: (1) marking timber and marketing assistance; (2) reforestation guidance; and (3) recommendations for timber-stand-improvement operations in immature stands. The landowner can obtain these services through the State Conservation Department in Albany. A district director will arrange for a meeting to explain the forest practice standards. If a mutual understanding is reached, the woodland owner signs a cooperative agreement and agrees to abide by the forest practice standards recommended.

To summarize the benefits of the Act: the private woodland owner is encouraged to practice good forestry through the services of foresters from the Conservation Department. The district director will recommend practices that will give the owner the best returns from his woods and at the same time keep the woods productive. All management goals must be consistent with the

characteristics of the species, the sites upon which they grow, and the systems of silviculture for which they are suited (*5*).

The objectives of the Forest Practice Act need greatly increased public attention, and more woodland owners need to become active cooperators if an improvement of the generally poor forest conditions is to be accomplished. District directors are available for assistance and guidance to help the woodland owner-cooperator obtain the goals of better management, greater productivity, better quality, and higher financial returns.

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Appendix

DEFINITION OF TERMS

Land Area Classes

Land area.—(a) **Bureau of the Census.** The area of dry land and land that is temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals that are less than 1/8 statute mile in width; and lakes, reservoirs, and ponds that are less than 40 acres in area. (b) **Forest Survey.** The same as the Bureau of the Census, except that the minimum width of streams, etc., is 120 feet, and the minimum size of lakes, etc., is 1 acre.

Forest land.—Land that is at least 16.7 percent stocked (contains at least 7.5 square feet of basal area) by forest trees of any size, or that formerly had such tree cover and is not currently developed for nonforest use. (Forest trees are woody plants that have a well-developed stem and usually are more than 12 feet in height at maturity.)

Commercial forest land.—Forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization. (Industrial wood: all roundwood products, except fuelwood.)

Noncommercial forest land.—Forest land that is incapable of yielding timber crops because of adverse site conditions (unproductive forest land), and productive forest land that is withdrawn from commercial timber use (productive-reserved forest land).

Productive-reserved forest land.—Forest land that is sufficiently productive to qualify as commercial forest land, but is withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas-tree production.

Unproductive forest land.—Forest land that is incapable of producing 20 cubic feet per acre of industrial wood under natural conditions, because of adverse site conditions.

Nonforest land.—Land that has never supported forests; and land formerly forested but now in nonforest use such as for crops, improved pasture, residential areas, and the like.

Ownership Classes

National Forest.—Federal lands that have been legally designated as National Forests or purchase units, and other lands that are under the administration of the Forest Service. There are none in New York.

Other Federal.—Federal lands (other than National Forests) that are administered by other Federal agencies.

State.—Lands that are owned by the State of New York or leased to the State for 50 years or more.

County and municipal.—Lands that are owned by counties and local public agencies or municipalities or leased to them for 50 years or more.

Forest industry.—Lands that are owned by companies or individuals operating wood-using plants.

Farmer-owned.—Lands that are owned by farm operators. Excludes land leased by farm operators from nonfarm owners.

Miscellaneous private.—Privately owned lands other than forest-industry and farmer-owned lands.

Stand-Size Classes

Stand.—A growth of trees on a minimum of 1 acre of forest land that is at least 16.7 percent stocked by forest trees of any size.

Sawtimber stands.—Stands that are at least 16.7 percent stocked with growing-stock trees (see definitions under "Tree Classes"), with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands that are at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands.—Stands that are at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

Nonstocked areas.—Commercial forest land that is less than 16.7 percent stocked with growing-stock trees.

Stocking Classes

Stocking.—The degree of occupancy of land by trees, measured in terms of basal area and/or number of trees in a stand compared to the basal area and/or number of trees required to utilize fully the growth potential of the land. The actual stocking at a point was evaluated against a standard of 75 square feet of basal area per acre. The stocking percentage for a sample plot is derived from the stocking for each of 10 points. Three categories of stocking are used:

All live trees.—These are used in the classification of forest land and forest types.

Growing-stock trees.—These are used in the classification of stand-size classes.

Desirable trees.—These are used in the classification of area-condition classes.

The degree of plot stocking is viewed as a *range* of values rather than single points. A fully stocked stand lies within the range of 100 to 133 percent of the basal-area standard. An overstocked stand contains more than 133 percent. The range for medium stocking is 60 to 100 percent and for poor stocking is 16.7 to 60 percent of the basal-area standard. Forest land with less than 16.7 percent of the basal-area standard is classed as nonstocked.

Tree Classes

Growing-stock trees.—Live trees of commercial species that are classified as sawtimber, poletimber, saplings, and seedlings; that is, all live trees of commercial species except rough and rotten trees. (See definitions under "Class of Timber.")

Acceptable trees.—Growing-stock trees of commercial species that meet specified standards of size and quality, but do not qualify as desirable trees.

Desirable trees.—Growing-stock trees of commercial species (a) that have no serious quality defects that limit present or prospective use for timber products, (b) that are of relatively high vigor, and (c) that contains no pathogens that may result in death or serious deterioration before rotation age.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot sawlog or two noncontiguous sawlogs, each 8 feet or longer, now or prospectively, and do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees.—(1) The same as above, except that rough trees do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (2) all live trees that are of noncommercial species.

Site Quality Classes

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood. Classifications are based upon the mean annual growth of growing stock attainable in fully stocked natural stands at culmination of mean annual growth.

Forest Types

The forest-type classification of each sample plot is based upon the species that make up a plurality of live-tree stocking. The many local forest types were combined into the following major forest types.

White pine-red pine-hemlock.—Forests in which eastern white pine, red pine, or hemlock, singly or in combination, make up a plurality of the stocking. (Common associates include aspen, birch, and maple.)

Spruce-fir.—Forests in which spruce or true firs, singly or in combination, make up a plurality of the stocking. (Common associates include white-cedar, tamarack, maple, birch, and hemlock.)

Oak-pine.—Forests in which hardwoods (usually upland oaks) make up a plurality of the stocking, but in which pines make up 25 to 50 percent of the stocking. (Common associates include gum, hickory, and yellow-poplar.)

Oak-hickory.—Forests in which upland oaks or hickory, singly or in combination, make up a plurality of the stocking, except where pines make up 25 to 50 percent, in which case the stand would be classified oak-pine. (Common associates include yellow-poplar, elm, maple, and black walnut.)

Oak-gum.—Bottomland forests in which blackgum, sweetgum, or oaks, singly or in combination, make up a plurality of the stocking, except where pines make up 25 to 50 percent, in which case the stand would be classified oak-pine. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-red maple.—Forests in which elm, ash, or red maple, singly or in combination, make up a plurality of the stocking. (Common associates include willow, sycamore, beech, and cottonwood.)

Maple-beech-birch.—Forests in which sugar maple, beech, or yellow birch, singly or in combination, make up a plurality of the stocking. (Common associates include hemlock, elm, basswood, and white pine.)

Aspen-birch.—Forests in which aspen, paper birch, or gray birch, singly or in combination, make up a plurality of the stocking. (Common associates include maple and balsam fir.)

Class of Timber

Softwoods.—Coniferous trees that are usually evergreen, having needles or scalelike leaves.

Hardwoods.—Dicotyledonous trees that are usually broad-leaved and deciduous.

Sawtimber trees.—Live trees of commercial species, (a) that are of the following minimum diameters at breast height—softwoods 9.0 inches and hardwoods 11.0 inches, and (b) that contain at least one 12-foot merchantable sawlog and meet regional specifications for freedom from defect.

Poletimber trees.—Live trees of commercial species that meet regional specifications of soundness and form, and are at least 5.0 inches in d.b.h. but are smaller than sawtimber size.

Saplings.—Live trees of commercial species that are 1.0 to 5.0 inches in diameter at breast height and of good form and vigor.

Seedlings.—Live trees of commercial species that are less than 1.0 inch in diameter at breast height and are expected to survive.

Rough and rotten trees.—See definitions under "Tree Classes."

Timber Volume

Growing-stock volume.—Net volume, in cubic feet, of live growing-stock trees that are 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for rot.

Standard cord.—A unit of measure for stacked bolts of wood encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying an average factor of 80 cubic feet of wood (inside bark) per rough cord.

Sawtimber volume.—Net volume in board feet, International ¼-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Sawlog.—A log that meets minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods. (See specifications under "Log Grade Classification.")

Sawlog portion.—That part of the bole of a sawtimber tree between the stump and the sawlog top (merchantable height).

Sawlog top.—The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Log Grade Classification

Log grades are a classification of logs based on external characteristics as indicators of quality or value. The log-grade standards and grading systems for white pine, southern (yellow) pine, and hardwood used in this forest survey of New York are shown in the following figures:

WHITE PINE LOG GRADES

(Unpublished trial speifications, revised 1963)

Log grade	*Minimum size*		*Defect allowance*		*Maximum weevil injury*	*Allowable knot size (inches) on 3 best faces or minimum clearness on 4 faces*
	Diameter	*Length*[1]	*Sweep or crook*	*Total cull including sweep*		
	Inches	*Feet*	*Percent*	*Percent*	*Number*	*Inches*
No. 1	12 & 13	8–16	20	50	0	4 faces free of knots ½" or larger full length of log.
	14+	10–16	20	50	0	2 faces free of knots ½" or larger full length of log, or 4 faces free of knots ½" or larger 50 percent length of log (6' minimum length)[2]
No. 2	6+	8–16	30	50	0	Sound red knots $\leq$[3] D/6 and no larger than 3". Black knots: Butt logs $\leq$ D/12 and no larger than 1½". Upper logs $\leq$ D/10 and no larger than 1½". or 4 faces free of knots ½" or larger 50 percent length of log.
No. 3	6+	8–16	40	50	8' logs: 1 weevil	Sound red knots $\leq$ D/3 and no larger than 5".
					10'+logs: 2 weevils	Black knots $\leq$ D/6 and no larger than 2½".
No. 4	6+	8–16	50	50	No limit	No limit.

[1] Plus trim.

[2] If the sum of the diameters of sound red knots plus 2X (sum of the diameters of dead or black knots) in inches is $\leq$ ½ the diameter of the log (in inches).

[3] $\leq$ means equal to or less than.

SOUTHERN PINE LOG GRADES

Grade factor	Grade			
	1	*2*	*3*	*4*
Minimum diameter	17″	10″	6″	6″
Maximum K value	1/5D	1/2D	None	None
Minimum specification on bad knots			Any bad knots present are localized in section not exceeding ¼″ circumference and length.	No limit

Exceptions

a. Lower one grade any log, not grade 4, having 3 inches or more of sweep if such sweep is ⅓ or more of log diameter.

b. Lower one grade any log, not grade 4, if heart-rot fruiting has occurred or is imminent, as indicated by conk or visible, massed, heart-rot hyphae.

K = number of overgrown knots plus sum of diameters of sound knots plus twice sum of diameters of unsound knots.

Bad knot: A knot with diameter $>$ D/6, or an unsound knot (advance decay or a hole $>$ ¼″ and 2″ or more deep).

Source: Forest Service Log Grades for Southern Pine. SE. Forest Exp. Sta., U.S. Forest Serv. Res. Paper SE-11, 1964.

Note: These log grades were applied to pitch pine in New York.

HARDWOOD FACTORY LUMBER LOG GRADES

(From U.S. Forest Products Laboratory Report D 1737)

GRADE FACTORS*		SPECIFICATIONS							
		Log Grade 1			Log Grade 2				Log Grade 3
Position in tree		Butts only	Butts & uppers		Butts & Uppers				Butts & uppers
Minimum diameter (inches)		13–15[1]	16–19	20+	11[2]		12+		8+
Minimum length (feet)		10+	10+	10+	10+	8–9	10–11	12+	8+
Clear cuttings** on each of the 3 best faces	Min. length (ft.)	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	—
	Min. yield in face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Max. sweep and crook allowance (percent of gross volume)		15			30				50
Max. cull and sweep allowance (percent of gross volume)		40[3]			50[4]				50

* End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in Forest Prod. Lab. Rpt. D 1737.

** A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.

[1] Ash and basswood butts can be 12 inches if otherwise meeting requirements for small No. 1's.

[2] 10-inch logs of all species can be No. 2 if otherwise meeting requirements for small No. 1's.

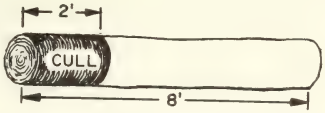
[3] Otherwise No. 1 logs with 41-50 percent cull can be No. 2.

[4] Otherwise No. 2 logs with 51-60 percent cull can be No. 3.

Source: A Guide to Hardwood Log Grading (pg. 11), NE. Forest Exp. Sta., Upper Darby, Pa. 1965.

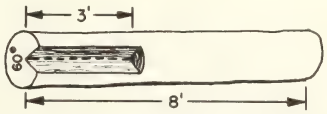
METHODS OF DETERMINING SCALING DEDUCTION

(Examples based on an 8-foot log with 20-inch scaling diameter)



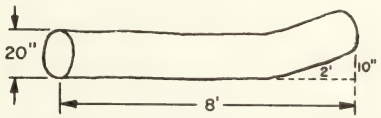
If section of bole is affected, deduct percent of log length affected.

Example: $\frac{2}{8} = 25$ percent cull



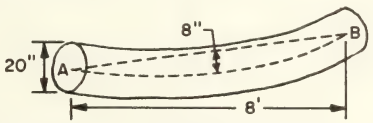
If sector is affected, multiply percent of circle times percent of length.

Example: $\frac{60°}{360°} \times \frac{3}{8} = 6$ percent cull



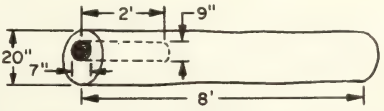
For a crook, multiply proportion of diameter displaced times proportion of log length affected by crook.*

Example: $\frac{10}{20} \times \frac{2}{8} = 12$ percent board-foot cull



For a sweep, determine sweep departure and subtract 1 inch for 8-foot logs or 2 inches for 16-foot logs. Divide by log diameter.

Example: $\frac{8 - 1}{20} = 35$ percent board-foot cull**



For interior cull, square out interior cull as a percent of total volume of the section. For board-foot cull, add 1 inch to width and to thickness; for cubic-foot cull, use actual dimensions of rot. For board-foot cull divide width and thickness by the scaling diameter (average d.i.b., small end) minus 1; for cubic-foot cull, divide by scaling diameter. Multiply fractions by percent of log affected.

Example: $\frac{8 \times 10}{20\text{-}1} \times \frac{2}{8} = 6$ percent cubic-foot cull.

* No reduction of cubic-foot volume will be made.

** If a straight line between A and B falls outside the bark, the affected section is over 50 percent cull in board feet.

HARDWOOD CONSTRUCTION LOG SPECIFICATIONS

GRADE FACTORS		SPECIFICATIONS
Position in tree		Butts and uppers
Scaling diameter (inches)		8+
Length, without trim (feet)		8+
Clear cuttings		No requirements: not graded on cutting basis.
Max. sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound surface defects permitted**	Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.	

* Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

** Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

Source: A Guide to Hardwood Log Grading, (pg. 28), NE. Forest Exp. Sta., Upper Darby, Pa. 1965.

Net Annual Growth and Timber Removals

Average annual net growth of growing stock.—The change (resulting from natural causes) in volume of sound wood in sawtimber and poletimber trees during the period between surveys, divided by the length of the period. (Components of net annual growth of growing stock include the increment in net volume of trees present at the beginning of the period and surviving to its end, plus net volume of trees reaching poletimber size during the period, minus the net volume of trees that died during the period, minus the net volume of trees that became rough or rotten trees during the period.)

Average annual ingrowth of growing stock.—The net cubic-foot volume of trees now classed as growing stock that were not tallied as such on the initial survey, divided by the length of the period between surveys.

Average annual mortality of growing stock.—The net cubic-foot volume removed from the growing stock through death from natural causes during the period between surveys, divided by the length of the period.

Average annual growing-stock removals.—The net cubic-foot volume of live growing-stock trees harvested or killed in logging, cultural operations such as timber-stand improvement, land-clearing, or changes in land use during the period between surveys and converted to an annual basis.

Net annual growth of growing stock.—The increase in net cubic-foot volume of growing stock for a specific year (i.e., 1967 for New York) rather than for a period of years.

Annual removals of growing stock.—The net cubic-foot volume of live growing-stock trees removed from the inventory for a specific year (1967 for New York) by harvesting, killing, land-clearing, or changing of land use. Note: Softwood and hardwood removals for 1967 shown in table 17 were from a trend curve and were not exactly the same as the estimated removals for that year.

Average annual net growth of sawtimber.—The change (resulting from natural causes)in net board-foot volume of sawtimber during the period between surveys, divided by the length of the period. (Components of net annual growth of sawtimber include the increment in net volume of sawtimber trees present at the beginning of the period and surviving to its end, plus the net volume of trees reaching sawtimber size during the period, minus the net volume of sawtimber trees that died during the period, minus the net volume of sawtimber trees that became rough or rotten during the period.)

Average annual ingrowth of sawtimber.—The net board-foot volume of trees now classed as sawtimber that were not tallied as such on the initial survey, divided by the length of the period between surveys.

Average annual mortality of sawtimber.—The net board-foot volume removed from live sawtimber through death from natural causes during the period between surveys, divided by the length of the period.

Average annual sawtimber removals.—The net board-foot volume of live sawtimber trees harvested or killed in logging, cultural operations such as timber-stand improvement, land-clearing, or changes in land use during the period between surveys, converted to an annual basis.

Net annual growth of sawtimber.—The increase in net board-foot volume of sawtimber for a specific year (1967 for New York) rather than for a period of years.

Annual removals of sawtimber.—The net board-foot volume of live sawtimber trees removed from the inventory for a specific year (1967 for New York) by harvesting, killing, land-clearing, or changing of land use. Note: Softwood and hardwood removals for 1967 shown in table 18 were from a trend curve and were not exactly the same as the estimated removals for that year.

FOREST SURVEY METHODS

The Northeastern Forest Experiment Station's Forest Survey project used the sampling-with-partial-replacement (SPR) design in the re-inventory of New York's timber resource. This design estimates forest area and timber volume by combining a subsample of remeasured plots, a regression updating of the initial inventory, and a new independent photo and ground plot inventory. Thus the SPR design combined two independent inventories to obtain a better estimate of the timber resource.

One inventory was based on the updating of the initial survey (1950). This procedure required the remeasurement of a subsample of the initial inventory ground plots. With the area change and current volume estimates obtained from the remeasured sample plots, regression techniques were used to update all the initial ground and photo plots to obtain an estimate of current timber volume and forest area.

The second inventory was also based on a large photo-plot sample with a subsample of ground plots. For the second measurement, the most recent aerial photography coverage of New York was used. Photo plots were pinpointed on each photograph to provide a uniformly distributed sample of the area. Each photo plot was examined stereoscopically and classified as either forest or nonforest land. Those classified as forest plots were further stratified into cubic-foot-volume-per-acre classes. A subsample of these photo plots, which was selected to be proportional to the area in a photo class, was measured on the ground. From this ground measurement, estimates of the mean and variance of each photo class were obtained. These means were expanded by the photo strata area to yield an independent estimate of forest area and timber volume.

The final estimates of current forest area and timber volume were developed by combining the two independent inventories. The combination process consisted of weighting each estimate by the reciprocal of its variance and then adding them. The associated sampling error for this new estimate was also obtained. These combined totals were partitioned into the various categories of area and volume (e.g., volume by species and d.b.h. class) using the data obtained from the new ground-plot sample.

In addition to estimating current timber volume and forest area, the forest survey of New York was designed to obtain an estimate of the components of change during the period between the initial and the current inventories. The parameters of interest include area change from forest to nonforest and vice versa, timber growth, timber removals, and timber mortality. All this information was obtained from the remeasured plots.

The timber-change parameters were obtained by a tree-by-tree reconciliation of each remeasured plot. The reconciliation code for each remeasured tree was used to make estimates of the parameters of change, by species. The estimates of change were expressed as an annual figure by dividing the total for the period by the number of years between measurements.

Remeasured Plot Phase

The initial forest inventory of New York consisted of a large photo-plot sample plus a ground measurement of a subsample of these photo plots. The photo plots were stratified according to land use as forest or nonforest. The forest plots were further classified into stand-size classes. Nearly 2,716 ground plots were measured by field crews during this first inventory. These ground samples were 1/5-acre circular plots.

At this second measurement occasion, a sample of 967 of the initial ground plots—selected randomly within each initial photo-plot class—was revisited. These remeasured plots were distributed within the eight geographic units of New York as follows:

Lake Plain	– 108	Western Adirondack	– 102
Southwest Highlands	– 107	Eastern Adirondack	– 78
South-central Highlands	– 102	Capitol District	– 125
St. Lawrence-N. Adirondack	– 132	Catskill-Lower Hudson	– 213

The plot center was relocated for each remeasured plot. On those plots that were forested, all the trees on the 1/5-acre were tallied. The new tally was reconciled with the initial tally to account for every tree at both occasions.

New Ground Plot Phase

The source of the new independent estimates of volume and forest area was a new photo stratification with a subsample of ground measurements. The photo sample of New York consisted of 63,299 photo points on the latest available aerial photography. A subset of 3,867 of these photo plots was located on the ground. Land use was verified and tree-measurement data were recorded for the forest plots. Unlike the initial inventory, in which fixed-radius 1/5-acre plots were tallied, the new ground plots consisted of a cluster of 10 prism points systematically covering approximately 1 acre. At each point, trees were selected for tally by using a prism with a basal-factor of 37.5. Area-attribute data were also tallied at each of the 10 points.

The new ground plots in New York were distributed within the geographic strata as follows:

Lake Plain	– 729	Western Adirondack	– 368
Southwest Highlands	– 429	Eastern Adirondack	– 275
South-central Highlands	– 529	Capitol District	– 427
St. Lawrence-N. Adirondack	– 532	Catskill-Lower Hudson	– 578

County Data

Many users of forest-survey data have shown a need for county information. To provide such information, within the framework of the survey design, county tables have been developed based on a survey-unit partitioning technique. First the survey-unit means and variances for the various photo-plot strata were applied to the photo-plot data for each county within the survey unit. This yielded an estimate of total volume or total commercial forest land area for each county. Next, the data from all the new ground plots in the unit were used to partition the county totals into their various components. For example, if a table of cubic-foot volume by softwoods and hardwoods was to be made for a county, the estimate of total cubic-foot volume for that county was partitioned into softwood and hardwood totals according to the proportion of softwoods and hardwoods for all new forest-survey ground plots within the unit.

Comparisons Between Inventories

After inventories have been completed for several points in time, it is desirable to evaluate the trends between the several inventories and to make comparisons. A comparison of the 1968 and the 1950 forest-survey estimates of volume, growth, removals, and mortality was made for New York. A computer program TRAS (Timber Resource Analysis System) was used.

Since the survey-unit boundaries were different at the first occasion, no direct comparisons of published data can be made between units. Present plans call for the same units to be used for the third inventory as were used for the second inventory so comparisons between units will be possible at that time. The procedure for obtaining county data (See: "Forest Survey Methods") was different on the two surveys, so comparisons of area and volume for a county are subject to a procedural difference in the estimates as well as a sampling error.

The initial published estimates and the second estimates of volumes are not directly comparable for the State. One reason for this is a significant change in the procedure for classifying a growing-stock tree since the 1950 forest survey.

At the time of the original inventory, any tree with an 8-foot sawlog meeting grade requirements, or with the potential for producing such a sawlog, was classed as a growing-stock tree. The current definition of growing stock requires the tree to have now or potentially at least one 12-foot sawlog meeting grade requirements. This change has caused many trees, especially hardwoods, to be reclassified from growing stock to the rough and/or rotten category.

The inventory-volume estimates were recomputed for 1950 by using adjusted numbers of trees by 2-inch diameter classes (stand tables for softwood and hardwood species groups). The results of the recalculations of timber volumes for 1950 showed that the reported softwood growing-stock volume remained the same, but the reported sawtimber volume was about 10 percent too high. The recalculations also showed that the reported hardwood growing-stock volume was about 10 percent too high and the

reported hardwood sawtimber volume was about 15 percent too high. These recalculated estimates, not the published estimates, were the basis for the comparisons that are shown in this report.

RELIABILITY OF THE ESTIMATES

The forest-area and timber-volume data presented in this report are based upon a carefully designed sample of forest conditions throughout New York. However, since neither every acre nor every tree in the State was measured, the data presented in this report are estimates. A measure of the reliability of these estimates is given by a sampling error. An associated sampling error was calculated for each estimate in this report. These appear in the data tables.

Briefly, this is how the sampling error indicates the reliability of an estimate. Our estimate of the total growing-stock volume in New York—12,200 million cubic feet, has an associated sampling error of 0.9 percent (110 million cubic feet). This means that our best estimate of the total growing-stock volume in New York in 1968 is 12,200 million cubic feet. If there are no errors in procedure, the odds are 2 to 1 that, if we repeated the survey in the same way, the resulting estimate of growing-stock volume would be between 12,090 million and 12,310 million cubic feet (12,200 $\pm$ 110). Similarly, the odds are 19 to 1 that it would be within $\pm$ 220 million cubic feet and 300 to 1 that it would be within $\pm$ 330 million cubic feet.

The computed sampling error is not a complete measure of reliability. There are other sources of error that this term does not include. There could be imperfections in our volume tables and equations and errors in field measurement. Procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in the statistical tables are:

	Sampling error (*percent*)
Commercial forest area: 14.3 million acres	0.8
Growing-stock volume: 12.2 billion cubic feet	0.9
Sawtimber volume: 24.4 billion board feet	1.3
Average net annual growth: 245.5 million cubic feet	5.2
Average annual removals: 133.8 million cubic feet	9.5

COMMERCIAL TREE SPECIES OF NEW YORK

All species of trees were coded separately on the sample plot tree-tally sheets. In data processing, some of the infrequently tallied species were combined with a species of similar characteristics, for example, black maple volume was included with sugar maple volume. Names of the species[5] are listed below in the same order as shown in tables 13 and 14.

Softwoods

Eastern white pine	*Pinus strobus*
Red pine	*P. resinosa*
Yellow pine:	
Pitch pine	*P. rigida*
Scotch pine	*P. sylvestris*
Norway spruce	*Picea abies*
White spruce	*P. glauca*
Black spruce	*P. mariana*
Red spruce	*P. rubens*
Balsam fir	*Abies balsamea*
Eastern hemlock	*Tsuga canadensis*
Other eastern softwoods:	
Atlantic white-cedar	*Chamaecyparis thyoides*
Eastern redcedar	*Juniperus virginiana*
Tamarack	*Larix laricina*
Northern white-cedar	*Thuja occidentalis*

Hardwoods

Select white oaks:	
White oak	*Quercus alba*
Swamp white oak	*Q. bicolor*
Bur oak	*Q. macrocarpa*
Chinkapin oak	*Q. muehlenbergii*
Select red oaks:	
Northern red oak	*Q. rubra*
Other red oaks:	
Scarlet oak	*Q. coccinea*
Pin oak	*Q. palustris*
Black oak	*Q. velutina*
Chestnut oak	*Q. prinus*
Post oak	*Q. stellata*
Hickory	*Carya* species
Yellow birch	*Betula alleghaniensis*
Sweet birch	*B. lenta*
Paper birch	*B. papyrifera*
Gray birch	*B. populifolia*

[5] Little, Elbert L., Jr. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dep. Agr., Agr. Handbook 41, 472 pp. 1953.

Sugar maple	*Acer saccharum*
Black maple	*A. nigrum*
Soft maples:	
Red maple	*A. rubrum*
Silver maple	*A. saccharinum*
American beech	*Fagus grandifolia*
White ash	*Fraxinus* species
Aspen	*Populus* species
American basswood	*Tilia americana*
Yellow-poplar	*Liriodendron tulipifera*
Black cherry	*Prunus serotina*
Elm	*Ulmus* species
Other eastern hardwoods:	
Flowering dogwood	*Cornus florida*
Butternut	*Juglans cinerea*
Black walnut	*J. nigra*
Cucumbertree	*Magnolia acuminata*
Black tupelo	*Nyssa sylvatica*
American sycamore	*Platanus occidentalis*
Black willow	*Salix nigra*

STATISTICAL DATA

Tables of statistical data for forest area, timber volume, annual growth, and timber removals for the entire State (National Standard Tables) and associated sampling errors for subtotals and totals appear first (tables 1 to 28).

These are followed by a series of tables that give statistics for each of the eight geographic units (tables 29 to 78). After the geographic-unit tables are the county statistics (tables 79 to 89). These county estimates have been prepared for users who want statistics for a county or group of counties. Estimated sampling errors are shown only for totals.

The users of these county data are urged to evaluate the sampling error for each total in relation to their planning needs, use of the data, and decisions based upon these data. County statistics were computed from means and variances of seven volume strata (stratified from aerial photographs) for each of the geographic units. These were applied to the volume strata within the county, assuming homogenous forest conditions throughout each stratum. If homogeneity does not exist, the actual errors of some county estimates may be greater than the calculated sampling errors.

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Table 1.—*Area by land class, New York, 1968*

Land class	Area	
	Thousand acres	*Percent*
Forest land:		
Commercial	14,281.1	47
Productive-reserved[1]	2,480.9	8
Unproductive	407.8	1
Total forest land	17,169.8	56
Nonforest land:		
Cropland[2]	6,470.0	21
Pasture[2]	2,301.8	7
Other[3]	4,694.6	16
Total nonforest land	13,466.4	44
Total area[4]	30,636.2	100

[1] Includes 9,200 acres of Christmas tree plantations.
[2] Source: 1964 Census of Agriculture.
[3] Includes swampland, industrial and urban areas, other nonforest land, and 222,800 acres classed as water by Forest Survey standards but defined by the Bureau of the Census as land.
[4] Source: U.S. Bureau of the Census, Areas of New York: 1960. (May 1967)

Table 2—*Area of commercial forest land, by ownership class, New York, 1968*

Ownership class	Area	
	Thousand acres	*Percent*
Federal[1]	57.5	([2])
State	711.4	5
County and municipal	123.1	1
Total public	892.0	6
Forest industry:		
Pulp and paper	782.3	6
Lumber	277.0	2
Other	121.0	1
Total forest industry	1,180.3	9
Farmer-owned	3,739.7	26
Miscellaneous private	8,469.1	59
Total private	13,389.1	94
All ownerships	14,281.1	100

[1] There is no National Forest land in New York.
[2] Less than 0.5 percent.

Table 3.—*Area of commercial forest land, by stand-size and ownership class, New York, 1968*

(In thousands of acres)

Stand-size class	All ownerships	Public	Forest industry	Farmer and other
Sawtimber stands	4,226.3	278.7	594.1	3,353.5
Poletimber stands	2,642.6	272.1	238.8	2,131.7
Sapling-seedling stands	6,107.2	269.7	323.8	5,513.7
Nonstocked areas	1,305.0	71.5	23.6	1,209.9
All classes	14,281.1	892.0	1,180.3	12,208.8

Table 4.—*Area of commercial forest land, by stand-volume and ownership class, New York, 1968*

(In thousands of acres)

Stand-volume per acre (board feet)[1]	All ownerships	Public	Forest industry	Farmer and other
Less than 1,500	8,754.0	511.6	525.1	7,717.3
1,500 to 5,000	4,897.3	343.5	606.6	3,947.2
More than 5,000	629.8	36.9	48.6	544.3
All classes	14,281.1	892.0	1,180.3	12,208.8

[1] International ¼-inch rule.

Table 5.—*Area of commercial forest land, by stocking class based on selected stand components, New York, 1968*

(In thousands of acres)

Stocking class (percent)	Stocking classified in terms of—				
	All trees	Growing-stock trees			Rough and rotten trees
		Total	Desirable	Acceptable	
160	41.5	—	—	—	9.3
150 to 160	428.3	11.8	—	18.0	8.7
140 to 150	1,596.0	129.0	—	102.2	7.7
130 to 140	2,352.2	235.1	—	159.1	50.2
120 to 130	2,432.2	515.1	—	384.6	20.7
110 to 120	2,138.7	1,082.2	—	858.8	77.2
100 to 110	1,441.6	1,470.3	—	1,185.3	137.1
90 to 100	895.0	1,525.6	8.7	1,480.1	295.9
80 to 90	649.8	1,537.3	5.3	1,694.6	554.8
70 to 80	643.7	1,620.8	5.3	1,720.6	774.2
60 to 70	425.3	1,260.5	13.0	1,551.6	1,092.8
50 to 60	415.8	1,014.2	43.2	1,154.7	1,670.1
40 to 50	281.0	983.9	74.1	1,054.9	1,980.1
30 to 40	246.5	710.2	228.0	738.3	2,267.5
20 to 30	183.0	690.3	664.6	714.0	2,402.9
10 to 20	68.9	671.2	1,874.0	665.4	1,848.7
Less than 10	41.6	823.6	11,364.9	798.9	1,083.2
Total	14,281.1	14,281.1	41,281.1	14,281.1	14,281.1

Table 6.—*Area of commercial forest land, by area condition and ownership class, New York, 1968*

(In thousands of acres)

Area condition class [1]	All ownerships	Public	Forest industry	Farmer and other
Class *10-30*	—	—	—	—
Class *40*	24.5	—	14.0	10.5
Class *50*	2,665.1	252.2	165.1	2,247.8
Class *60*	6,443.8	420.0	642.7	5,381.1
Class *70*	5,147.7	219.8	358.5	4,569.4
All classes	14,281.1	892.0	1,180.3	12,208.8

[1] Class *10*.—Areas fully stocked with desirable trees and not overstocked.
Class *20*.—Areas fully stocked with desirable trees, but overstocked with all live trees.
Class *30*.—Areas medium to fully stocked with desirable trees, and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.
Class *40*.—Areas medium to fully stocked with desirable trees and with 30 percent or more of the area controlled by other trees and/or conditions that ordinarily present occupancy by desirable trees.
Class *50*.—Areas poorly stocked with desirable trees, but fully stocked with growing-stock trees.
Class *60*.—Areas poorly stocked with desirable trees, but with medium to full stocking of growing-stock trees.
Class *70*.—Areas poorly stocked with desirable trees, and poorly stocked with growing-stock trees.

Table 7.—*Area of commercial forest land, by site and ownership class, New York, 1968*

(In thousands of acres)

Growth-per-acre class (cubic feet)	All ownerships	Public	Forest industry	Farmer and other
120 to 165	882.6	164.2	113.0	605.4
85 to 120	1,836.9	103.9	115.9	1,617.1
50 to 85	5,551.0	309.1	439.6	4,802.3
Less than 50	6,010.6	314.8	511.8	5,184.0
All classes	14,281.1	892.0	1,180.3	12,208.8

Table 8.—*Area of commercial forest land, by forest type and ownership class, New York, 1968*

(In thousands of acres)

Forest type[1]	All ownerships	Public ownerships	Private ownerships
White-red pine	1,737.1	215.5	1,521.6
Spruce-fir	771.4	57.3	714.1
Oak-pine	250.9	5.2	245.7
Oak-hickory	1,276.6	51.7	1,224.9
Elm-ash-red maple	3,281.7	188.0	3,093.7
Maple-beech-birch	5,840.8	306.0	5,534.8
Aspen-birch	1,122.6	68.3	1,054.3
All types	14,281.1	892.0	13,389.1

[1] Includes 564,100 acres of plantations—451,300 acres in the white pine forest type and 112,800 acres in the spruce-fir forest type.

Table 9.—*Area of noncommercial forest land, by forest type, New York, 1968*

(In thousands of acres)

Forest type	All areas	Productive-reserved areas	Unproductive areas
White-red pine	73.1	50.5	22.6
Spruce-fir	769.8	542.1	227.7
Oak-pine	49.0	5.3	43.7
Oak-hickory	72.7	26.6	46.1
Elm-ash-red maple	58.6	—	58.6
Maple-beech-birch	1,647.2	1,647.2	—
Aspen-birch	218.3	209.2	9.1
All types	2,888.7	2,480.9	407.8

Table 10.—*Number of growing-stock trees on commercial forest land, by diameter class, softwoods and hardwoods, New York, 1968*

(In thousands of trees)

D.b.h. class (inches)	All species	Softwoods	Hardwoods
1.0 to 2.9	2,593,422	643,613	1,949,809
3.0 to 4.9	1,130,513	317,048	813,465
Total saplings	3,723,935	960,661	2,763,274
5.0 to 6.9	620,232	184,850	435,382
7.0 to 8.9	378,266	106,355	271,911
9.0 to 10.9	164,092	—	164,092
Total poletimber	1,162,590	291,205	871,385
9.0 to 10.9	51,717	51,717	—
11.0 to 12.9	114,087	27,865	86,222
13.0 to 14.9	60,844	12,827	48,017
Total small sawtimber	226,648	92,409	134,239
15.0 to 16.9	31,717	7,092	24,625
17.0 to 18.9	16,024	3,698	12,326
19.0 to 28.9	12,102	3,476	8,626
29.0 and larger	2,932	482	2,450
Total large sawtimber	62,775	14,748	48,027
All classes	5,175,948	1,359,023	3,816,925

Table 11.—*Net volume of timber on commercial forest land, by class of timber, softwoods and hardwoods, New York, 1968*

(In millions of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	5,018.3	1,591.3	3,427.0
Upper-stem portion	1,050.5	211.1	839.4
All sawtimber	6,068.8	1,802.4	4,266.4
Poletimber trees	6,131.0	1,378.3	4,752.7
All growing-stock trees	12,199.8	3,180.7	9,019.1
Rough trees	1,485.3	430.6	1,054.7
Rotten trees	1,068.2	82.8	985.4
Total, all timber	14,753.3	3,694.1	11,059.2

Table 12.—*Net volume of growing stock and sawtimber on commercial forest land, softwoods and hardwoods, New York, 1968*

Ownership or stand-size class	Growing stock (million cubic feet)			Sawtimber (million board feet)[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
			BY OWNERSHIP CLASSES			
Public	998.3	398.6	599.7	1,790.2	594.4	1,195.8
Forest industry	1,181.1	344.9	836.2	2,731.5	770.3	1,961.2
Farmer and other	10,020.4	2,437.2	7,583.2	19,886.7	5,634.1	14,252.6
All ownerships	12,199.8	3,180.7	9,019.1	24,408.4	6,998.8	17,409.6
			BY STAND-SIZE CLASSES			
Sawtimber stands	6,321.8	1,853.2	4,468.6	16,645.6	5,000.2	11,645.4
Poletimber	3,510.1	782.6	2,727.5	3,933.4	958.8	2,974.6
Sapling-seedling stands	2,326.6	535.4	1,791.2	3,760.9	1,022.5	2,738.4
Nonstocked areas	41.3	9.5	31.8	68.5	17.3	51.2
All classes	12,199.8	3,180.7	9,019.1	24,408.4	6,998.8	17,409.6

[1] International ¼-inch rule.

Table 13.—*Net volume of growing stock on commercial forest land, by species and diameter class, New York, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White pine	950.6	136.7	156.1	124.3	126.6	106.8	93.8	65.6	53.4	71.3	16.0
Red pine	327.3	116.4	99.3	67.5	28.2	7.1	5.5	1.2	1.6	.5	—
Yellow pines	20.7	4.1	5.8	4.6	4.7	1.1	—	—	—	.4	—
Spruce	472.6	145.7	96.1	81.5	54.5	38.3	24.9	17.7	8.8	5.1	—
Balsam fir	177.6	64.5	59.7	29.2	18.8	4.3	.6	—	.5	—	—
Hemlock	1,082.0	205.2	196.6	175.4	168.1	114.1	81.5	59.5	39.3	37.9	4.4
Other softwoods	149.9	41.0	51.1	28.0	14.1	6.7	6.1	1.1	1.8	—	—
Total softwoods	3,180.7	713.6	664.7	510.5	415.0	278.4	212.4	145.1	105.4	115.2	20.4
Select white oaks	254.9	27.4	29.2	35.2	40.2	38.8	26.2	22.8	10.8	15.7	8.6
Select red oaks	818.2	62.5	112.2	141.8	131.6	118.6	94.4	61.9	34.7	53.6	6.9
Other red oaks	129.5	9.9	24.8	23.7	12.6	11.8	17.9	9.3	7.0	12.5	—
Chestnut oak	228.7	22.7	45.8	56.0	44.3	27.7	18.8	9.4	.9	3.1	—
Hickory	255.1	53.2	55.0	44.1	37.0	32.2	14.3	9.0	5.9	4.4	—
Yellow birch	396.6	48.8	64.6	69.8	53.1	51.4	36.5	29.1	16.8	21.8	4.7
Sweet birch	136.4	36.4	32.9	32.7	19.8	6.6	5.5	1.8	.4	.3	—
Paper birch	175.8	40.8	47.3	36.2	23.0	17.1	4.6	3.7	1.7	1.4	—
Sugar maple	1,997.2	334.9	349.6	356.8	305.7	240.9	151.9	111.5	59.6	77.5	8.8
Soft maples	1,614.6	335.6	357.4	348.0	221.8	137.2	89.5	60.2	25.6	34.8	4.5
Beech	780.4	100.3	122.2	129.8	120.5	114.3	90.6	53.2	31.3	18.2	—
White ash	600.3	110.3	120.8	121.7	95.4	63.7	38.2	20.3	12.9	15.1	1.9
Aspen	414.5	81.7	105.5	97.0	64.8	36.0	15.4	6.7	3.7	2.5	1.2
Basswood	385.6	27.7	54.7	77.6	67.9	55.9	50.8	22.4	15.7	12.1	.8
Yellow-poplar	40.6	1.1	2.5	6.1	5.6	5.5	4.4	5.1	4.2	6.1	—
Black cherry	318.5	39.2	54.0	55.3	57.3	50.8	28.7	17.4	7.8	8.0	—
Elm	391.1	48.5	54.2	67.0	55.2	44.2	36.2	24.6	17.9	32.6	10.7
Other hardwoods	81.1	9.5	15.7	15.0	10.0	11.2	5.8	3.1	3.4	5.6	1.8
Total hardwoods	9,019.1	1,390.5	1,648.4	1,713.8	1,365.8	1,063.9	729.7	471.5	260.3	325.3	49.9
All species	12,199.8	2,104.1	2,313.1	2,224.3	1,780.8	1,342.3	942.1	616.6	365.7	440.5	70.3

Table 14.—*Net volume of sawtimber on commercial forest land, by species and diameter class, New York, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
White pine	2,608.7	428.2	456.8	398.0	368.3	279.2	246.1	353.4	78.7
Red pine	397.5	231.5	103.1	27.9	20.7	5.4	6.0	2.9	—
Yellow pines	39.4	16.1	17.1	4.0	—	—	—	2.2	—
Spruce	910.6	326.6	209.1	144.4	94.9	72.3	37.3	26.0	—
Balsam fir	218.6	122.0	76.4	16.1	2.4	—	1.7	—	—
Hemlock	2,606.6	607.4	594.0	423.5	321.4	256.7	186.9	192.9	23.8
Other softwoods	217.4	103.4	51.7	25.9	23.3	5.0	8.1	—	—
Total softwoods	6,998.8	1,835.2	1,508.2	1,039.8	831.0	618.6	486.1	577.4	102.5
Select white oaks	668.5	—	142.3	149.6	107.9	98.9	50.3	77.9	41.6
Select red oaks	2,016.1	—	473.9	455.4	380.5	266.8	155.4	252.7	31.4
Other red oaks	299.2	—	46.0	46.5	74.5	40.9	31.6	59.7	—
Chestnut oak	408.7	—	159.7	109.6	79.1	40.9	4.4	15.0	—
Hickory	397.0	—	132.3	122.0	58.0	40.0	25.2	19.5	—
Yellow birch	956.0	—	214.1	220.3	165.9	133.8	84.5	113.3	24.1
Sweet birch	129.9	—	70.9	26.4	21.8	8.0	1.6	1.2	—
Paper birch	217.0	—	90.8	73.3	20.7	17.0	8.9	6.3	—
Sugar maple	3,876.2	—	1,123.8	950.7	636.4	485.6	267.9	368.9	42.9
Soft maples	2,324.3	—	833.1	548.4	374.3	260.6	118.7	166.4	22.8
Beech	1,789.4	—	453.6	466.7	394.4	235.2	148.3	91.2	—
White ash	967.0	—	344.2	245.1	154.5	87.4	59.0	67.4	9.4
Aspen	546.2	—	259.1	153.5	69.2	29.4	18.0	11.7	5.3
Basswood	891.2	—	245.6	213.6	203.5	95.6	70.0	57.9	5.0
Yellow-poplar	129.9	—	19.8	20.8	18.2	21.8	19.7	29.6	—
Black cherry	697.0	—	216.9	206.0	124.2	76.5	35.2	38.2	—
Elm	930.2	—	203.7	173.9	149.2	108.3	84.3	160.1	50.7
Other hardwoods	165.8	—	35.0	43.3	23.7	13.0	15.0	27.4	8.4
Total hardwoods	17,409.6	—	5,064.8	4,225.1	3,056.0	2,059.7	1,198.0	1,564.4	241.6
All species	24,408.4	1,835.2	6,573.0	5,264.9	3,887.0	2,678.3	1,684.1	2,141.8	344.1

[1] International ¼-inch rule.

Table 15.—*Net volume of sawtimber on commercial forest land, by species and quality class, New York, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
Softwoods:					
White pine	2,608.7	34.4	164.9	1,190.1	1,219.3
Red pine	397.5	2.6	6.3	259.6	129.0
Yellow pine	39.4	—	.9	24.5	14.0
Other softwoods[3]	3,953.2	—	—	—	—
Total softwoods	6,998.8	37.0	172.1	1,474.2	1,362.3
Hardwoods:					
Select white oaks	668.5	141.7	168.9	274.7	83.2
Select red oaks	2,016.1	513.9	440.7	796.9	264.6
Other red oaks	299.2	61.6	51.0	127.6	59.0
Chestnut oak	408.7	75.0	95.5	187.8	50.4
Hickory	397.0	35.3	57.0	169.8	134.9
Yellow birch	956.0	180.9	244.5	471.0	59.6
Sweet birch	129.9	6.2	29.4	80.2	14.1
Paper birch	217.0	24.4	54.4	124.2	14.0
Sugar maple	3,876.2	598.9	923.1	1,801.0	553.2
Soft maples	2,324.3	192.8	419.3	1,241.7	470.5
Beech	1,789.4	93.9	299.5	1,118.7	277.3
White ash	967.0	170.3	255.9	374.1	166.7
Aspen	546.2	31.5	82.1	279.7	152.9
Basswood	891.2	121.2	249.1	434.5	86.4
Yellow-poplar	129.9	48.4	16.7	38.6	26.2
Black cherry	697.0	78.9	137.1	318.2	162.8
Elm	930.2	172.9	243.1	386.1	128.1
Other hardwoods	165.8	8.5	28.2	94.6	34.5
Total hardwoods	17,409.6	2,556.3	3,795.5	8,319.4	2,738.4
Hardwood quality (in percent)	100	15	22	47	16

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.

[3] Species other than pine are not graded into standard-lumber grades.

Table 16.—*Average annual net growth and removal of growing stock and sawtimber on commercial forest land, by species, New York, 1950-67*[1]

Species	Growing stock		Sawtimber	
	Annual net growth	Annual timber removals	Annual net growth	Annual timber removals
	Thousand cubic feet		*Thousand board feet*	
Softwoods:				
White pine	26,646	12,600	97,190	56,751
Red pine	9,609	1,626	20,281	1,137
Yellow pines	910	—	1,497	—
Spruce	7,129	6,500	3,759	22,413
Balsam fir	6,563	5,292	8,630	5,606
Hemlock	17,010	11,795	49,134	48,450
Other softwoods	1,633	2,887	3,509	3,743
Total softwoods	69,500	40,700	184,000	138,100
Hardwoods:				
Select white oaks	3,952	3,177	14,085	10,390
Select red oaks	19,043	7,565	65,474	20,021
Other red oaks	3,174	—	7,869	—
Chestnut oak	4,350	808	14,409	1,426
Hickory	6,187	933	13,887	3,882
Yellow birch	1,814	4,374	3,969	18,898
Sweet birch	3,375	3,561	5,034	13,135
Paper birch	2,486	1,151	3,196	3,699
Sugar maple	40,314	31,672	98,911	132,755
Soft maples	33,612	9,698	50,556	35,364
Beech	11,825	11,700	29,527	41,669
White ash	18,359	4,599	45,263	11,764
Aspen	11,563	883	24,133	—
Basswood	8,235	5,604	25,564	18,882
Yellow-poplar	714	—	3,258	—
Black cherry	8,333	3,481	21,075	9,255
Elm[2]	— 3,276	3,051	— 7,348	11,779
Other hardwoods	1,940	843	3,638	2,081
Total hardwoods	176,000	93,100	422,500	335,000
Total, all species	245,500	133,800	606,500	473,100

[1] Based on trend levels between 1950 and 1967 as developed from remeasured permanent sample plots.

[2] Elm had negative growth due to extremely high mortality.

Table 17.—*Annual net growth and removal of growing stock on commercial forest land, by ownership class, softwoods and hardwoods, New York*

(In thousands of cubic feet)

Species group	All ownerships	Public	Forest industry	Farmer and other
AVERAGE GROWTH AND REMOVALS FOR 1950-67				
AVERAGE ANNUAL NET GROWTH				
Softwoods	69,500	9,369	7,093	53,038
Hardwoods	176,000	11,974	15,096	148,930
All species	245,500	21,343	22,189	201,968
AVERAGE ANNUAL REMOVALS				
Softwoods	40,700	956	5,736	34,008
Hardwoods	93,100	1,214	6,004	85,882
All species	133,800	2,170	11,740	119,890
GROWTH AND REMOVALS FOR 1967				
ANNUAL NET GROWTH				
Softwoods	80,100	10,798	8,175	61,127
Hardwoods	202,200	13,756	17,343	171,101
All species	282,300	24,554	25,518	232,228
ANNUAL REMOVALS				
Softwoods	26,700	627	3,763	22,310
Hardwoods	110,000	1,434	7,094	101,472
All species	136,700	2,061	10,857	123,782

Table 18.—*Annual net growth and removal of sawtimber on commercial forest land, by ownership class, softwoods and hardwoods, New York*

(In thousands of board feet) [1]

Species group	All ownerships	Public	Forest industry	Farmer and other
AVERAGE GROWTH AND REMOVALS FOR 1950-67				
AVERAGE ANNUAL NET GROWTH				
Softwoods	184,000	17,736	16,715	149,549
Hardwoods	422,500	29,632	43,138	349,730
All species	606,500	47,368	59,853	499,279
AVERAGE ANNUAL REMOVALS				
Softwoods	138,100	257	18,361	119,482
Hardwoods	335,000	1,995	15,490	317,515
All species	473,100	2,252	33,851	436,997
GROWTH AND REMOVALS FOR 1967				
ANNUAL NET GROWTH				
Softwoods	199,000	19,182	18,078	161,740
Hardwoods	457,000	32,052	46,660	378,288
All species	656,000	51,234	64,738	540,028
ANNUAL REMOVALS				
Softwoods	84,000	156	11,168	72,676
Hardwoods	379,000	2,257	17,525	359,218
All species	463,000	2,413	28,693	431,894

[1] International ¼-inch rule.

Table 19.—*Components of average annual net growth of growing stock and sawtimber on commercial forest land, softwoods and hardwoods, New York, 1950-67*

Components	All species	Softwoods	Hardwoods
	GROWING STOCK		
	Thousand cubic feet		
Growth on initial growing stock[1]	184,455	47,426	137,029
Ingrowth—saplings that became poletimber	218,553	62,692	155,861
Gross growth	403,008	110,118	292,890
Cull increment	52,608	13,318	39,290
Annual mortality	104,900	27,300	77,600
Annual net growth	245,500	69,500	176,000
	SAWTIMBER		
	Thousand board feet[2]		
Growth on initial sawtimber inventory[1]	343,860	111,793	232,067
Ingrowth—poletimber trees that became sawtimber	482,822	137,045	345,777
Gross growth	826,682	248,838	577,844
Cull increment	88,682	21,838	66,844
Annual mortality	131,500	43,000	88,500
Annual net growth	606,500	184,000	422,500

[1] Including growth on trees that were cut.
[2] International ¼-inch rule.

Table 20.—*Average annual mortality of growing stock and sawtimber on commercial forest land, by species, New York, 1950-67*

Species	Growing stock	Sawtimber
	Thousand cubic feet	*Thousand board feet*[1]
Softwoods:		
White pine	6,577	11,356
Red pine	1,893	2,370
Yellow pines	830	945
Spruce	7,353	14,779
Balsam fir	3,497	2,895
Hemlock	6,189	10,139
Other softwoods	961	516
Total	27,300	43,000
Hardwoods:		
Select white oaks	1,080	1,053
Select red oaks	4,199	4,895
Other red oaks	700	707
Chestnut oak	2,878	2,291
Hickory	1,364	1,038
Yellow birch	8,519	12,598
Sweet birch	744	376
Paper birch	1,645	1,099
Sugar maple	8,889	11,060
Soft maples	7,411	8,080
Beech	4,633	5,292
White ash	4,048	3,384
Aspen	7,729	1,804
Basswood	2,590	2,215
Yellow-poplar	158	270
Black cherry	3,291	5,499
Elm	15,534	24,490
Other hardwoods	2,188	2,349
Total	77,600	88,500
Total, all species	104,900	131,500

[1] International ¼-inch rule.

Table 21.—*Average annual mortality of growing stock and sawtimber on commercial forest land, softwoods and hardwoods, New York, 1950-67*

Ownership and cause	Growing stock (thousand cubic feet)			Sawtimber (thousand board feet)[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
			BY OWNERSHIP			
Public	7,564	1,496	6,068	6,753	1,631	5,122
Forest industry	10,091	3,000	7,091	14,690	5,182	9,508
Farmer and other	87,245	22,804	64,441	110,057	36,187	73,870
All ownerships	104,900	27,300	77,600	131,500	43,000	88,500
			BY CAUSE			
Fire	150	—	150	386	—	386
Insects	913	593	320	148	148	—
Disease	38,153	4,676	33,477	49,042	4,736	44,306
Other	32,065	14,562	17,503	48,253	27,555	20,698
Unknown	33,619	7,469	26,150	33,671	10,561	23,110
All causes	104,900	27,300	77,600	131,500	43,000	88,500

[1] International ¼-inch rule.

Table 22.—*Sampling errors for major forest area and timber-volume classes in New York, 1968*

Table No.	Item classification	Sampling error
	FOREST AREA	
		Percent
1	Forest-land area:	
	Commercial	0.8
	Unproductive	10.0
	Total	0.7
2	Ownership:[1]	
	Forest industry	6
	Farmer-owned	4
	Misc. private	2
	Farmer and misc. private	1
3	Stand-size class:	
	Sawtimber	3
	Poletimber	4
	Sapling-seedling	3
	Nonstocked areas	9
4	Stand-volume per acre (board feet):	
	Less than 1,500	2
	1,500 to 5,000	3
	More than 5,000	9
6	Area-condition class:	
	40	(*)
	50	4
	60	2
	70	3
7	Growth-per-acre class (cubic feet):	
	120 to 165 cu. ft.	8
	85 to 120 cu. ft.	6
	50 to 85 cu. ft.	3
	Less than 50 cu. ft.	3
8	Forest type:	
	White-red pine	6
	Spruce-fir	9
	Oak-pine	15
	Oak-hickory	6
	Elm-ash-red maple	4
	Maple-beech-birch	3
	Aspen-birch	9
	Plantations	11
	TIMBER VOLUME	
		Cubic feet / *Board feet*
		Percent
11	Class of timber:	
	Sawtimber trees	2 —
	Poletimber trees	2 —
	All growing stock	1 —
	Rough trees	3 —
	Rotten trees	3 —
	All live trees	1 —
12	Ownership and stand size:	
	Public	8 10
	Forest industry	7 8
	Farmer and other	2 2
	Sawtimber stands	3 2
	Poletimber stands	4 5
	Sapling-seedling	4 5
	Nonstocked areas	16 25
	Softwoods	3 4
	Hardwoods	1 2
	All classes	1 1

Continued

* Sampling error of 50 to 99 percent.

[1] Some classifications have no sampling errors and some less important classifications have been omitted.

Table 22.—*Continued*

Table No.	Item classification	Sampling error: *Cubic feet* Percent	Sampling error: *Board feet* Percent
	TIMBER VOLUME		
13–	Species:		
14	White pine	7	7
	Red pine	16	19
	Yellow pines	26	27
	Spruce	8	9
	Balsam fir	11	17
	Hemlock	5	6
	Other softwoods	16	19
	Select white oaks	8	9
	Select red oaks	6	7
	Other red oaks	14	15
	Chestnut oak	10	12
	Hickory	8	11
	Yellow birch	6	8
	Sweet birch	9	14
	Paper birch	9	15
	Sugar maple	4	5
	Soft maples	4	6
	Beech	5	6
	White ash	5	7
	Aspen	7	12
	Basswood	8	9
	Yellow-poplar	24	23
	Black cherry	7	9
	Elm	6	8
	Other hardwoods	16	21
	Diameter classes: (inches)		
	5.0- 6.9	2	—
	7.0- 8.9	2	—
	9.0-10.9[2]	2	5
	11.0-12.9	2	2
	13.0-14.9	2	2
	15.0-16.9	3	3
	17.0-18.9	3	3
	19.0-20.9	5	4
	21.0-28.9	5	4
	29.0 and larger	6	11

Table No.	Item classification	Sampling error: *Cubic feet* Percent	Sampling error: *Board feet* Percent
	GROWTH-REMOVAL		
16	Growth by:		
	Softwoods	13	17
	Hardwoods	6	7
	All species	5	7
16	Removals by:		
	Softwoods	19	21
	Hardwoods	11	13
	All species	10	11
17–	Growth by ownership:		
18	Public	27	46
	Forest industry	31	36
	Farmer and other	6	11
	Removals by ownership:		
	Public	61	74
	Forest industry	62	32
	Farmer and other	7	12
	MORTALITY		
20	By species group:		
	Softwoods	14	24
	Hardwoods	8	14
	All species	8	13
21	By ownership:		
	Other public	30	50
	Forest industry	26	35
	Farmer and other	8	14
21	By cause:		
	Fire	100	100
	Insect	52	72
	Disease	11	18
	Other	15	25
	Unknown	13	20

[2] Board-foot sampling error for this class is for softwoods only.

Table 23.—*Output of timber products, by source of material, softwoods and hardwoods, New York, 1967*

Product and species group	Standard units	Total output		Roundwood products		Plant byproducts	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
Sawlogs:							
Softwood	M bd. ft.[1]	63,526	10,988	63,526	10,988	—	—
Hardwood	M bd. ft.[1]	289,850	45,037	289,850	45,037	—	—
Total	M bd. ft.[1]	353,376	56,025	353,376	56,025	—	—
Veneer logs:							
Softwood	M bd. ft.[1]	—	—	—	—	—	—
Hardwood	M bd. ft.[1]	22,053	3,426	22,053	3,426	—	—
Total	M bd. ft.[1]	22,053	3,426	22,053	3,426	—	—
Pulpwood:							
Softwood	Std. cords[2]	133,700	10,696	132,600	10,608	1,100	88
Hardwood	Std. cords[2]	329,400	26,352	261,700	20,936	67,700	5,416
Total	Std. cords[2]	463,100	37,048	394,300	31,544	68,800	5,504
Poles:							
Softwood	M pieces	5	31	5	31	—	—
Hardwood	M pieces	—	—	—	—	—	—
Total	M pieces	5	31	5	31	—	—
Posts (round & split):							
Softwood	M pieces	700	434	700	434	—	—
Hardwood	M pieces	4,100	2,542	4,100	2,542	—	—
Total	M pieces	4,800	2,976	4,800	2,976	—	—

CONTINUED

Table 23.—*Continued*

Product and species group	Standard units	Total output		Roundwood products		Plant byproducts	
		Number of units	Thousand cubic feet	Number of units	Thousand cubic feet	Number of units	Thousand cubic feet
Other:[3]							
Softwood	M cu. ft.	1,131	1,131	97	97	1,034	1,034
Hardwood	M cu. ft.	6,812	6,812	3,785	3,785	3,027	3,027
Total	M cu. ft.	7,943	7,943	3,882	3,882	4,061	4,061
Total industrial products:[4]							
Softwood	—	—	23,280	—	22,158	—	1,122
Hardwood	—	—	84,169	—	75,726	—	8,443
Total	—	—	107,449	—	97,884	—	9,565
Fuelwood:							
Softwood	Std. cords	50,212	4,017	44,000	3,520	6,212	497
Hardwood	Std. cords	482,738	38,619	400,000	32,000	82,738	6,619
Total	Std. cords	532,950	42,636	444,000	35,520	88,950	7,116
All products:							
Softwood	—	—	27,297	—	25,678	—	1,619
Hardwood	—	—	122,788	—	107,726	—	15,062
Total	—	—	150,085	—	133,404	—	16,681

[1] International ¼-inch rule.
[2] Rough wood basis (includes chips converted to equivalent standard cords).
[3] Includes hewn ties, excelsior bolts, shingle bolts, turnery bolts, chemical wood, etc.
[4] There were no outputs in 1967 for cooperage, piling, and mine timbers.
Note: The industrial timber-product outputs are based upon a 100-percent canvass of the primary wood-using industries made in 1968 by the New York State Conservation Department.

Table 24.—*Output of roundwood products, by source, softwoods and hardwoods, New York, 1967*

(In thousands of cubic feet)

Product and species group	All sources	Growing-stock trees[1]			Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[2]
		Total	Sawtimber	Poletimber			
PRINCIPAL INDUSTRIAL PRODUCTS							
Sawlogs:							
Softwood	10,988	10,375	10,363	12	8	—	605
Hardwood	45,037	43,534	43,376	158	255	173	1,075
Total	56,025	53,909	53,739	170	263	173	1,680
Veneer logs and bolts:							
Softwood	—	—	—	—	—	—	—
Hardwood	3,426	3,426	3,426	—	—	—	—
Total	3,426	3,426	3,426	—	—	—	—
Pulpwood:							
Softwood	10,608	10,327	7,800	2,527	—	—	281
Hardwood	20,936	17,940	13,055	4,885	1,002	437	1,557
Total	31,544	28,267	20,855	7,412	1,002	437	1,838
MISCELLANEOUS INDUSTRIAL PRODUCTS							
Poles:							
Softwood	31	31	26	5	—	—	—
Hardwood	—	—	—	—	—	—	—
Total	31	31	26	5	—	—	—

CONTINUED

Table 24.—*Continued*

Product and species group	All sources	Growing-stock trees[1]			Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[2]
		Total	Sawtimber	Poletimber			
Posts: (round and split)							
Softwood	434	422	319	103	—	—	12
Hardwood	2,542	2,178	1,585	593	122	53	189
Total	2,976	2,600	1,904	696	122	53	201
Other:							
Softwood	97	94	71	23	—	—	3
Hardwood	3,785	3,243	2,360	883	181	79	282
Total	3,882	3,337	2,431	906	181	79	285
All misc. industrial products:							
Softwood	562	547	416	131	—	—	15
Hardwood	6,327	5,421	3,945	1,476	303	132	471
Total	6,889	5,968	4,361	1,607	303	132	486
Total industrial products:							
Softwood	22,158	21,249	18,579	2,670	8	—	901
Hardwood	75,726	70,321	63,802	6,519	1,560	742	3,103
Total	97,884	91,570	82,381	9,189	1,568	742	4,004

	NONINDUSTRIAL PRODUCTS						
Fuelwood:							
Softwood	3,520	473	315	158	2,078	624	345
Hardwood	32,000	9,455	5,456	3,999	10,463	7,801	4,281
Total	35,520	9,928	5,771	4,157	12,541	8,425	4,626
	ALL PRODUCTS						
Softwood	25,678	21,722	18,894	2,828	2,086	624	1,246
Hardwood	107,726	79,776	69,258	10,518	12,023	8,543	7,384
Total	133,404	101,498	88,152	13,346	14,109	9,167	8,630

[1] On commercial forest land.
[2] Includes trees less than 5.0 inches in diameter, and tree tops and limbs from commercial forest areas or any material from noncommercial forest land or nonforest land such as fence row and suburban areas.

Table 25.—*Timber removal from growing stock on commercial forest land, by item, softwoods and hardwoods, New York, 1967*

(In thousands of cubic feet)

Item	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	53,909	10,375	43,534
Veneer logs and bolts	3,426	—	3,426
Pulpwood	28,267	10,327	17,940
Poles	31	31	—
Posts	2,600	422	2,178
Other	3,337	94	3,243
Fuelwood	9,928	473	9,455
All products[1]	101,498	21,722	79,776
Logging residues	22,666	4,471	18,195
Total removals	124,164	26,193	97,971

[1] There were no removals in 1967 for cooperage, piling, and mine timbers.

Table 26.—*Timber removal from live sawtimber on commercial forest land, by item, softwoods and hardwoods, New York, 1967*

(In thousands of board feet)[1]

Item	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	261,899	40,120	221,779
Veneer logs and bolts	22,053	—	22,053
Pulpwood	88,703	30,258	58,445
Poles	101	101	—
Posts	8,333	1,237	7,096
Other	10,840	275	10,565
Fuelwood	25,647	1,222	24,425
All products[2]	417,576	73,213	344,363
Logging residues	17,856	4,366	13,490
Total removals	435,432	77,579	357,853

[1] International ¼-inch rule.
[2] There were no removals in 1967 for cooperage, piling, and mine timbers.

Table 27.—*Volume of unused residues at primary manufacturing plants, by industry and type of residue, softwoods and hardwoods, New York, 1967*

(In thousands of cubic feet)

Species group and type of residue	All industries	Lumber	Veneer and plywood	Other
Softwoods:				
Coarse[1]	1,728	1,726	—	2
Fine[2]	513	513	—	—
Total	2,241	2,239	—	2
Hardwoods:				
Coarse[1]	3,710	3,624	—	86
Fine[2]	1,960	1,829	12	119
Total	5,670	5,453	12	205
All species:				
Coarse[1]	5,438	5,350	—	88
Fine[2]	2,473	2,342	12	119
Total	7,911	7,692	12	207

[1] Material such as slabs, edgings, and veneer cores.
[2] Material such as sawdust and shavings.

Table 28.—*Projections of net annual growth, available cut, and inventory of growing stock and sawtimber on commercial forest land, New York, 1968-98*[1]

Species group	1968 (inventory year)	1978	1988	1998
	GROWING STOCK (*Million cubic feet*)			
Softwoods:				
Cut	29.7	55.6	82.7	107.7
Growth	81.4	91.7	101.4	108.9
Inventory	3,197.1	3,635.7	3,900.6	3,991.5
Hardwoods:				
Cut	155.5	220.5	295.9	370.9
Growth	239.5	279.2	325.6	369.5
Inventory	9,295.2	10,008.8	10,437.6	10,565.9
Total:				
Cut	185.2	276.1	378.6	478.6
Growth	320.9	370.9	427.0	478.4
Inventory	12,492.3	13,644.5	14,338.2	14,557.4
	SAWTIMBER (*Million board feet*)[2]			
Softwoods:				
Cut	93	172	247	305
Growth	202	229	247	253
Inventory	6,949	7,777	8,027	7,737
Hardwoods:				
Cut	515	682	815	865
Growth	533	563	566	535
Inventory	17,422	16,916	14,983	11,998
Total:				
Cut	608	854	1,062	1,170
Growth	735	792	813	788
Inventory	24,371	24,693	23,010	19,735

[1] Based upon the following assumptions: farmland abandonment and reversion to forest will be offset by forest land lost by land-clearing, growth rates will continue to be the same for the next 30 years, and trends in forestry programs will continue at the same rate as in the past. Timber available for cutting is assumed to be that amount that will bring growth and cut into balance by the end of 30 years.

[2] International ¼-inch rule.

Table 29.—*Area of commercial forest land by ownership class, geographic unit, and region, 1968*

(In thousands of acres)

Unit and region	Public				Forest industry		Other private		Total private	All ownerships
	Federal	State	Other	Total	Lumber	Other	Farmer	Other		
SOUTHWESTERN:										
Lake Plain	12.0	83.2	14.4	109.6	36.0	—	713.8	1,029.2	1,779.0	1,888.6
Southwest Highlands	0	108.8	10.4	119.2	11.5	5.1	642.3	877.8	1,536.7	1,655.9
South-central Highlands	6.5	203.0	8.1	217.6	64.3	20.3	785.9	1,065.4	1,935.9	2,153.5
Total	18.5	395.0	32.9	446.4	111.8	25.4	2,142.0	2,972.4	5,251.6	5,698.0
NORTHERN:										
St. Lawrence-N. Adirondack	10.3	118.5	13.3	142.1	56.4	370.1	659.4	1,277.0	2,362.9	2,505.0
Western Adirondack	9.9	113.9	29.7	153.5	19.5	219.0	241.3	854.7	1,334.5	1,488.0
Eastern Adirondack	0	9.3	10.0	19.3	52.0	256.5	84.9	881.9	1,275.3	1,294.6
Total	20.2	241.7	53.0	314.9	127.9	845.6	985.6	3,013.6	4,972.7	5,287.6
SOUTHEASTERN:										
Capitol District	5.8	32.3	16.5	54.6	32.0	27.1	320.9	805.6	1,185.6	1,240.2
Catskill-Lower Hudson	13.0	42.4	20.7	76.1	5.3	5.2	291.2	1,677.5	1,979.2	2,055.3
Total	18.8	74.7	37.2	130.7	37.3	32.3	612.1	2,483.1	3,164.8	3,295.5
State total	57.5	711.4	123.1	892.0	277.0	903.3	3,739.7	8,469.1	13,389.1	14,281.1
	Sampling errors, in percent [1]									
Southwestern	—	—	—	—	25	(*)	5	4	2	1
Northern	—	—	—	—	24	10	9	4	1	1
Southeastern	—	—	—	—	(*)	(*)	9	3	2	2
State total	—	—	—	—	20	9	4	2	1	1

* More than 50 percent sampling error.

[1] Acreages in public holdings were obtained from ownership records and therefore have no sampling errors.

Table 30.—*Area of commercial forest land by stand-size class, geographic unit, and region, 1968*

(In thousands of acres)

Unit and region	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	Total
SOUTHWESTERN:[1]					
Lake Plain	463.4	266.3	956.7	202.2	1,888.6
Southwest Highlands	351.3	244.0	843.2	217.4	1,655.9
South-central Highlands	596.9	514.4	808.2	234.0	2,153.5
Total	1,411.6	1,024.7	2,608.1	653.6	5,698.0
NORTHERN:					
St. Lawrence-N. Adirondack	645.9	460.9	1,162.4	235.8	2,505.0
Western Adirondack	414.3	194.7	607.4	271.6	1,488.0
Eastern Adirondack	696.4	210.1	381.8	6.3	1,294.6
Total	1,756.6	865.7	2,151.6	513.7	5,287.6
SOUTHEASTERN:					
Capitol District	428.0	213.6	523.0	75.6	1,240.2
Catskill-Lower Hudson	630.1	538.6	824.5	62.1	2,055.3
Total	1,058.1	752.2	1,347.5	137.7	3,295.5
State total	4,226.3	2,642.6	6.107.2	1,305.0	14,281.1
	Sampling errors, in percent				
Southwestern	6	8	3	10	1
Northern	4	7	5	19	1
Southeastern	6	7	5	23	2
State total	3	4	3	9	1

[1] Estimates for the Southwestern Region were revised and are slightly different from those in the preliminary statistical tables.

Table 31.—*Area of commercial forest land by stocking-percent class, geographic unit, and region, 1968*

(In thousands of acres)

Unit and region	Stocking class (*in percent*)				Total
	70 or more	40 to 70	10 to 40	less than 10	
SOUTHWESTERN:					
Lake Plain	1,067.5	407.5	285.8	127.8	1,888.6
Southwest Highlands	819.4	377.8	300.1	158.6	1,655.9
South-central Highlands	1,288.4	371.3	381.1	112.7	2,153.5
Total	3,175.3	1,156.6	967.0	399.1	5,698.0
NORTHERN:					
St. Lawrence-N. Adirondack	1,289.4	680.3	368.9	166.4	2,505.0
Western Adirondack	594.8	364.1	350.2	178.9	1,488.0
Eastern Adirondack	898.6	345.6	50.4	—	1,294.6
Total	2,782.8	1,390.0	769.5	345.3	5,287.6
SOUTHEASTERN:					
Capitol District	755.5	284.5	152.3	47.9	1,240.2
Catskill-Lower Hudson	1,413.6	427.5	182.9	31.3	2,055.3
Total	2,169.1	712.0	335.2	79.2	3,295.5
State total	8,127.2	3,258.6	2,071.7	823.6	14,281.1

Table 32.—*Area of commercial forest land by site class, geographic unit, and region, 1968*

(In thousands of acres)

Unit and region	Site class (*cubic feet per acre*)				Total
	Over 120	85 to 120	50 to 85	Under 50	
SOUTHWESTERN:					
Lake Plain	118.7	276.7	607.4	885.8	1,888.6
Southwest Highlands	128.4	268.1	650.9	608.5	1,655.9
South-central Highlands	80.1	310.2	793.5	969.7	2,153.5
Total	327.2	855.0	2,051.8	2,464.0	5,698.0
NORTHERN:					
St. Lawrence-N. Adirondack	174.0	234.8	1,102.1	994.1	2,505.0
Western Adirondack	131.4	247.3	732.4	376.9	1,488.0
Eastern Adirondack	132.5	211.4	472.9	477.8	1,294.6
Total	437.9	693.5	2,307.4	1,848.8	5,287.6
SOUTHEASTERN:					
Capitol District	68.2	133.6	502.8	535.6	1,240.2
Catskill-Lower Hudson	49.3	154.8	689.0	1,162.2	2,055.3
Total	117.5	288.4	1,191.8	1,697.8	3,295.5
State total	882.6	1,836.9	5,551.0	6,010.6	14,281.1
	Sampling errors, in percent				
Southwestern	13	8	5	4	1
Northern	11	12	5	5	1
Southeastern	21	13	6	4	2
State total	8	6	3	3	1

Table 33.—*Area of commercial forest land by forest type, geographic unit, and region, 1968*

(In thousands of acres)

Unit and region[1]	White or red pine	Spruce-fir	Plantation	Oak-pine	Oak-hickory	Elm-ash-red maple	Maple-beech-birch	Aspen-paper birch	Total
SOUTHWESTERN:									
Lake Plain	50.6	19.3	79.6	—	121.0	766.0	761.0	91.1	1,888.6
Southwest Highlands	69.2	13.1	90.6	17.6	136.2	279.0	924.9	125.3	1,655.9
South-central Highlands	212.1	16.1	141.8	32.8	130.1	447.6	1,025.4	147.6	2,153.5
Total	331.9	48.5	312.0	50.4	387.3	1,492.6	2,711.3	364.0	5,698.0
NORTHERN:									
St. Lawrence-N. Adirondack	159.7	298.3	84.5	6.3	28.4	576.5	974.5	376.8	2,505.0
Western Adirondack	98.0	106.7	37.5	3.8	17.6	242.9	817.7	163.8	1,488.0
Eastern Adirondack	205.9	194.6	14.9	47.8	54.6	109.8	561.4	105.6	1,294.6
Total	463.6	599.6	136.9	57.9	100.6	929.2	2,353.6	646.2	5,287.6
SOUTHEASTERN:									
Capitol District	247.3	3.9	56.8	43.3	189.2	304.3	344.5	50.9	1,240.2
Catskill-Lower Hudson	243.0	6.6	58.4	99.3	599.5	555.6	431.4	61.5	2,055.3
Total	490.3	10.5	115.2	142.6	788.7	859.9	775.9	112.4	3,295.5
State total	1,285.8	658.6	564.1	250.9	1,276.6	3,281.7	5,840.8	1,122.6	14,281.1
			Sampling errors, in percent						
Southwestern	13	39	15	35	12	6	4	14	1
Northern	10	10	21	30	24	8	5	13	1
Southeastern	10	(*)	23	19	8	7	8	22	2
State total	6	9	11	15	6	4	3	9	1

[1]Estimates for the Southwestern Region were revised and are slightly different from those in the preliminary statistical tables.
* Sampling error greater than 50 percent.

Table 34.—*Area of commercial forest land by local forest type, major forest type, and region, 1968*

(In thousands of acres)

Forest type	South-western	Northern	South-eastern	Total[1]
White pine	67.1	215.0	220.3	502.4
White-red pine	—	—	4.6	4.6
White pine-hemlock	5.5	25.1	11.5	42.1
W. pine-hemlock-red pine	—	—	3.5	3.5
Hemlock	259.3	169.2	191.1	619.6
Red pine	—	23.0	3.5	26.5
Pitch pine	—	31.3	55.8	87.1
White-red-jack pine	331.9	463.6	490.3	1,285.8
Balsam fir	—	120.5	—	120.5
Red spruce and black spruce	9.5	280.7	4.0	294.2
Tamarack	—	6.7	—	6.7
White spruce	20.7	8.8	—	29.5
Northern white-cedar	5.5	124.3	—	129.8
Red spruce-hemlock	12.8	58.6	6.5	77.9
Spruce-fir	48.5	599.6	10.5	658.6
Oak-pine	50.4	57.9	142.6	250.9
Chestnut oak	23.4	—	132.0	155.4
W. oak-r. oak-hickory	125.0	22.6	223.1	370.7
Northern red oak	37.1	32.1	46.5	115.7
Yellow-poplar-W.O.-N.R.O.	176.7	40.6	358.4	575.7
Sweetgum-yellow poplar	5.5	—	—	5.5
Oak-hemlock	19.6	5.3	28.7	53.6
Oak-hickory	387.3	100.6	788.7	1,276.6
Bl. ash-elm-red-maple	1,355.9	841.9	744.3	2,942.1
Elm-ash-r. maple-hemlock	94.2	43.3	51.8	189.3
Elm-ash-r. maple-w. pine	42.5	44.0	63.8	150.3
Elm-ash-red maple	1,492.6	929.2	859.9	3,281.7
Maple-beech-birch	2,446.1	2,066.0	626.7	5,138.8
Black cherry	44.3	48.9	49.2	142.4
Maple-beech-birch-hemlock	206.6	217.1	91.5	515.2
Maple-beech-birch-w. pine	—	6.2	8.5	14.7
Maple-beech-birch-spruce-fir	14.3	15.4	—	29.7
Maple-beech-birch	2,711.3	2,353.6	775.9	5,840.8

Continued

Table 34.—*Continued*

Forest type	South-western	Northern	South-eastern	Total[1]
Aspen	358.8	366.3	79.9	805.0
Paper birch	5.2	72.5	4.0	81.7
Gray birch	—	207.4	28.5	235.9
Aspen-birch	364.0	646.2	112.4	1,122.6
Plantations	312.0	136.9	115.2	564.1
All forest types	5,698.0	5,287.6	3,295.5	14,281.1

[1] Totals for the white-red-jack pine and the spruce-fir forest types exclude plantations, which are shown separately.

Table 35.—*Volume of timber on commercial forest by class of timber, geographic unit, and region, 1968*

(In millions of cubic feet)

Unit and region	Sawtimber trees			Pole-timber trees	Total growing stock	Rough trees	Rotten trees	Total, all timber
	Sawlogs	Upper stems	Total					
SOUTHWESTERN:								
Lake Plain	591.1	130.9	722.0	737.7	1,459.7	142.0	113.8	1,715.5
Southwest Highlands	527.4	121.7	649.1	716.2	1,365.3	158.6	80.9	1,604.8
South-central Highlands	773.3	169.7	943.0	1,048.0	1,991.0	213.1	134.9	2,339.0
Total	1,891.8	422.3	2,314.1	2,501.9	4,816.0	513.7	329.6	5,659.3
NORTHERN:								
St. Lawrence-N. Adirondack	672.4	142.1	814.5	929.3	1,743.8	199.9	247.4	2,191.1
Western Adirondack	525.5	103.8	629.3	586.5	1,215.8	163.9	165.3	1,545.0
Eastern Adirondack	665.5	121.6	787.1	555.9	1,343.0	163.5	158.2	1,664.7
Total	1,863.4	367.5	2,230.9	2,071.7	4,302.6	527.3	570.9	5,400.8
SOUTHEASTERN:								
Capitol District	482.0	93.6	575.6	523.5	1,099.1	168.3	61.1	1,328.5
Catskill-Lower Hudson	781.1	167.1	948.2	1,033.9	1,982.1	276.0	106.6	2,364.7
Total	1,263.1	260.7	1,523.8	1,557.4	3,081.2	444.3	167.7	3,693.2
State total	5,018.3	1,050.5	6,068.8	6,131.0	12,199.8	1,485.3	1,068.2	14,753.3
	Sampling errors, in percent							
Southwestern	—	—	3	3	2	5	5	2
Northern	—	—	2	2	1	4	4	1
Southeastern	—	—	3	3	2	4	6	2
State total	—	—	2	2	1	3	3	1

Table 36.—*Volume of growing stock on commercial forest land by ownership class, softwoods and hardwoods, geographic unit, and region, 1968*

(In millions of cubic feet)

Unit and region	State[1]			Forest industry			Other private			Total
	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	
SOUTHWESTERN:										
Lake Plain	35.2	58.9	94.1	4.2	15.8	20.0	150.8	1,194.8	1,345.6	1,459.7
Southwest Highlands	30.6	94.8	125.4	—	37.5	37.5	173.2	1,029.2	1,202.4	1,365.3
South-central Highlands	103.2	175.8	279.0	7.7	85.2	92.9	298.1	1,321.0	1,619.1	1,991.0
Total	169.0	329.5	498.5	11.9	138.5	150.4	622.1	3,545.0	4,167.1	4,816.0
NORTHERN:										
St. Lawrence-N. Adirondack	45.7	38.5	84.2	107.1	287.0	394.1	366.9	898.6	1,265.5	1,743.8
Western Adirondack	70.1	98.5	168.6	75.5	176.8	252.3	305.7	489.2	794.9	1,215.8
Eastern Adirondack	8.0	15.8	23.8	133.6	190.0	323.6	441.4	554.2	995.6	1,345.0
Total	123.8	152.8	276.6	316.2	653.8	970.0	1,114.0	1,942.0	3,056.0	4,302.6
SOUTHEASTERN:										
Capitol District	68.5	43.0	111.5	16.8	32.9	49.7	323.0	614.9	937.9	1,099.1
Catskill-Lower Hudson	37.3	74.4	111.7	—	11.0	11.0	378.1	1,481.3	1,859.4	1,982.1
Total	105.8	117.4	223.2	16.8	43.9	60.7	107.1	2,096.2	2,797.3	3,081.2
State total	398.6	599.7	998.3	344.9	836.2	1,181.1	2,437.2	7,583.2	10,020.4	12,199.8
				Sampling errors, in percent						
Southwestern	—	—	12	52	27	26	9	3	3	2
Northern	—	—	14	12	8	7	6	4	3	1
Southeastern	—	—	20	46	46	27	7	3	2	2
State total	—	—	8	11	8	7	4	2	2	1

[1] Includes volume in other public ownerships—52.3 million cubic feet in the Southwestern Region, 69.8 million cubic feet in the Northern Region, and 95.0 million cubic feet in the Southeastern Region.

Table 37.—*Volume of sawtimber on commercial forest land by ownership class, softwoods and hardwoods, geographic unit, and region, 1968*

(In millions of board feet)[1]

Unit and region	State[2]			Forest industry			Other private			Total
	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	
Lake Plain	47.9	111.5	159.4	10.2	31.2	41.4	277.8	2,336.6	2,614.4	2,815.2
SOUTHWESTERN:										
Southwest Highlands	30.9	155.0	185.9	—	98.2	98.2	298.4	1,777.5	2,075.9	2,360.0
South-central Highlands	141.6	291.9	433.5	11.6	253.8	136.0	692.4	2,106.0	2,798.4	3,367.9
Total	220.4	558.4	778.8	21.8	253.8	275.6	1,268.6	6,220.1	7,488.7	8,543.1
NORTHERN:										
St. Lawrence-N. Adirondack	87.1	71.0	158.1	200.1	649.9	850.0	742.8	1,825.9	2,568.7	3,576.8
Western Adirondack	26.7	236.2	362.9	171.1	467.7	638.8	672.7	1,141.6	1,814.3	2,816.0
Eastern Adirondack	19.3	47.7	67.0	324.9	518.4	843.3	1,170.2	1,261.6	2,431.8	3,342.1
Total	233.1	354.9	588.0	696.1	1,636.0	2,332.1	2,585.7	4,229.1	6,814.8	9,734.9
SOUTHEASTERN:										
Capitol District	114.0	120.2	234.2	52.4	65.1	117.5	825.4	1,031.7	1,857.1	2,208.8
Catskill-Lower Hudson	26.9	162.3	189.2	—	6.3	6.3	954.4	2,771.7	3,726.1	3,921.6
Total	140.9	282.5	423.4	52.4	71.4	123.8	1,779.8	3,803.4	5,583.2	6,130.4
State total	594.4	1,195.8	1,790.2	770.3	1,961.2	2,731.5	5,634.1	14,252.6	19,886.7	24,408.4
Sampling errors, in percent										
Southwestern	—	—	14	58	32	30	10	4	3	2
Northern	—	—	18	14	9	8	6	5	4	2
Southeastern	—	—	23	50	30	29	7	4	3	2
State total	—	—	10	14	9	8	4	2	2	1

[1] International ¼-inch rule.

[2] Includes volume in other public ownerships—83.6 million board feet in the Southwestern Region, 154.6 million board feet in the Northern Region, and 179.4 million board feet in the Southeastern Region.

Table 38.—*Volume of growing stock on commercial forest land by stand-size class, softwoods and hardwoods, geographic unit, and region, 1968*

(In millions of cubic feet)

Unit and region[1]	Sawtimber stands			Poletimber stands			Other stands			Total
	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	
SOUTHWESTERN:										
Lake Plain	95.5	671.0	766.5	58.5	298.1	356.6	36.2	300.4	336.6	1,459.7
Southwest Highlands	93.7	528.8	622.5	71.2	329.4	400.6	38.9	303.3	342.2	1,365.3
South-central Highlands	247.9	687.1	935.0	116.5	606.9	723.4	44.6	288.0	332.6	1,991.0
Total	437.1	1,886.9	2,324.0	246.2	1,234.4	1,480.6	119.7	891.7	1,011.4	4,816.0
NORTHERN:										
St. Lawrence-N. Adirondack	200.2	606.5	806.7	163.5	362.3	525.8	156.0	255.3	411.3	1,743.8
Western Adirondack	244.3	430.8	675.1	113.1	183.5	296.6	93.9	150.2	244.1	1,215.8
Eastern Adirondack	416.7	500.5	917.2	86.0	152.7	238.7	80.3	106.8	187.1	1,343.0
Total	861.2	1,537.8	2,399.0	362.6	698.5	1,061.1	330.2	512.3	842.5	4,302.6
SOUTHEASTERN:										
Capitol District	275.1	350.3	625.4	80.6	187.9	268.5	52.6	152.6	205.2	1,099.1
Catskill-Lower Hudson	279.8	693.6	973.4	93.2	606.7	699.9	42.4	266.4	308.8	1,982.1
Total	554.9	1,043.9	1,598.8	173.8	794.6	968.4	95.0	419.0	514.0	3,081.2
State total	1,853.2	4,468.6	6,321.8	782.6	2,727.5	3,510.1	544.9	1,823.0	2,367.9	12,199.8
				Sampling errors, in percent						
Southwestern	11	5	5	18	7	7	15	7	6	2
Northern	7	5	4	13	8	7	10	7	6	1
Southeastern	9	6	5	18	8	7	15	8	8	2
State total	5	3	2	9	5	5	7	4	5	1

[1] Estimates for the Southwestern Region were revised and are slightly different from the preliminary statistical tables.

Table 39.—*Volume of sawtimber on commercial forest land by stand-size class, softwoods and hardwoods, geographic unit, and region, 1968*

(In millions of board feet)[1]

Unit and region[2]	Sawtimber stands			Poletimber stands			Other stands			Total
	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	
SOUTHWESTERN:										
Lake Plain	227.3	1,683.3	1,910.6	57.2	360.2	417.4	51.4	435.8	487.2	2,815.2
Southwest Highlands	203.7	1,287.5	1,491.2	60.4	347.3	407.7	65.2	395.9	461.1	2,360.0
South-central Highlands	622.4	1,535.2	2,157.6	134.6	618.8	753.4	88.6	368.3	456.9	3,367.9
Total	1,053.4	4,506.0	5,559.4	252.2	1,326.3	1,578.5	205.2	1,200.0	1,405.2	8,543.1
NORTHERN:										
St. Lawrence-N. Adirondack	574.0	1,707.3	2,281.3	206.2	406.4	612.6	249.8	433.1	682.9	3,576.8
Western Adirondack	665.7	1,293.9	1,959.6	132.6	241.1	373.7	172.2	310.5	482.7	2,816.0
Eastern Adirondack	1,188.4	1,473.1	2,661.5	128.5	182.2	310.7	197.5	172.4	369.9	3,342.1
Total	2,428.1	4,474.3	6,902.4	467.3	829.7	1,297.0	619.5	916.0	1,535.5	9,734.9
SOUTHEASTERN:										
Capitol District	749.7	803.3	1,553.0	117.0	170.8	287.8	125.1	242.9	368.0	2,208.8
Catskill-Lower Hudson	769.0	1,861.8	2,630.8	122.3	647.8	770.1	90.0	430.7	520.7	3,921.6
Total	1,518.7	2,665.1	4,183.8	239.3	818.6	1,057.9	215.1	673.6	888.7	6,130.4
State total	5,000.2	11,645.4	16,645.6	958.8	2,974.6	3,933.4	1,039.8	2,789.6	3,829.4	24,408.4
				Sampling errors, in percent						
Southwestern	16	5	4	17	9	9	20	9	8	2
Northern	7	4	3	15	11	9	11	10	8	2
Southeastern	9	6	4	16	11	10	18	11	10	2
State total	5	3	2	9	6	5	9	6	5	1

[1] International ¼-inch rule.
[2] Estimates for the Southwestern Region were revised and are slightly different from those in the preliminary statistical tables.

Table 40.—*Volume of growing stock on commercial forest land by forest type, geographic unit, and region, 1968*

(In millions of cubic feet)

Unit and region	White or red pine	Spruce-fir	Plantation	Oak-pine	Oak-hickory	Elm-ash-red maple	Maple-beech-birch	Aspen-paper birch	Total
SOUTHWESTERN:									
Lake Plain	67.4	16.7	76.1	—	156.0	533.1	584.6	25.8	1,459.7
Southwest Highlands	86.8	6.2	65.2	37.1	180.1	242.6	715.2	32.1	1,365.3
South-central Highlands	274.0	2.3	158.0	58.3	163.3	420.3	869.1	45.7	1,991.0
Total	428.2	25.2	299.3	95.4	499.4	1,196.0	2,168.9	103.6	4,816.0
NORTHERN:									
St. Lawrence-N. Adirondack	163.3	232.2	94.6	9.7	17.6	381.2	725.4	119.8	1,743.8
Western Adirondack	145.0	130.7	55.7	5.6	21.4	261.7	530.3	65.4	1,215.8
Eastern Adirondack	242.5	221.4	23.2	44.0	44.9	85.0	565.2	116.8	1,343.0
Total	550.8	584.3	173.5	59.3	83.9	727.9	1,820.9	302.0	4,302.6
SOUTHEASTERN:									
Capitol District	321.5	5.7	65.8	50.8	161.9	192.6	274.1	26.7	1,099.1
Catskill-Lower Hudson	306.8	.8	82.1	101.6	690.8	418.5	380.1	1.4	1,982.1
Total	628.3	6.5	147.9	152.4	852.7	611.1	654.2	28.1	3,081.2
State total	1,607.3	616.0	620.7	307.1	1,436.0	2,535.0	4,644.0	433.7	12,199.8
Sampling errors, in percent									
Southwestern	15	(*)	19	35	13	8	5	20	2
Northern	11	10	23	36	27	9	5	14	1
Southeastern	10	(*)	25	21	8	8	9	34	2
State total	7	10	13	17	6	5	3	11	1

* Sampling error is greater than 50 percent.

Table 41.—*Volume of sawtimber on commercial forest land by forest type, geographic unit, and region, 1968*

(In millions of board feet)[1]

Unit and region	White or red pine	Spruce-fir	Plantation	Oak-pine	Oak-hickory	Elm-ash-red maple	Maple-beech-birch	Aspen-paper birch	Total
SOUTHWESTERN:									
Lake Plain	165.4	27.9	82.0	—	324.4	986.8	1,197.7	31.0	2,815.2
Southwest Highlands	154.9	6.0	34.7	71.8	341.3	406.5	1,298.8	46.0	2,360.0
South-central Highlands	599.7	—	266.3	58.4	261.6	551.3	1,587.0	43.6	3,367.9
Total	920.0	33.9	383.0	130.2	927.3	1,944.6	4,083.5	120.6	8,543.1
NORTHERN:									
St. Lawrence-N. Adirondack	475.6	357.0	113.7	23.6	39.0	725.7	1,693.5	148.7	3,576.8
Western Adirondack	331.6	256.4	69.3	12.7	31.4	564.6	1,424.6	125.4	2,816.0
Eastern Adirondack	657.0	513.0	92.7	127.2	50.2	118.6	1,510.2	273.2	3,342.1
Total	1,464.2	1,126.4	275.7	163.5	120.6	1,408.9	4,628.3	547.3	9,734.9
SOUTHEASTERN:									
Capitol District	790.1	12.0	87.9	114.5	355.0	294.7	535.5	19.1	2,208.8
Catskill-Lower Hudson	792.4	—	72.5	186.0	1,443.6	700.8	726.3	—	3,921.6
Total	1,582.5	12.0	160.4	300.5	1,798.6	995.5	1,261.8	19.1	6,130.4
State total	3,966.7	1,172.3	819.1	594.2	2,846.5	4,349.0	9,973.6	687.0	24,408.4
				Sampling errors, in percent					
Southwestern	16	(*)	24	39	15	9	6	29	2
Northern	12	12	29	39	30	10	5	17	2
Southeastern	10	(*)	30	22	9	11	10	47	2
State total	7	12	16	18	8	6	4	15	1

* Sampling error is greater than 50 percent.

[1] International ¼-inch rule.

Table 42.—*Growing-stock volume in the LAKE PLAIN UNIT, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	60.6	15.1	16.3	8.3	4.6	2.4	5.9	4.3	2.5	1.2	—
Red pine	34.4	9.7	8.5	14.8	1.4	—	—	—	—	—	—
Hemlock	73.5	17.6	16.7	9.0	10.8	6.3	4.5	3.6	2.2	1.8	1.0
Other softwoods	21.7	5.8	10.6	2.7	2.6	—	—	—	—	—	—
Total softwoods	190.2	48.2	52.1	34.8	19.4	8.7	10.4	7.9	4.7	3.0	1.0
Select white oaks	23.8	2.8	1.0	2.1	2.3	5.6	.9	4.2	1.8	1.4	1.7
Select red oaks	58.5	2.4	3.4	4.3	8.3	12.6	6.3	6.1	2.0	9.2	3.9
Hickory	82.8	19.7	19.7	13.3	11.1	7.5	3.3	2.6	4.3	1.3	—
Yellow birch	25.3	5.6	7.5	5.8	2.3	2.2	.4	—	.8	.7	—
Sugar maple	275.1	39.0	51.5	51.0	38.9	33.1	25.7	18.8	8.2	8.9	—
Soft maples	211.6	36.0	37.6	45.8	29.7	23.9	12.6	12.4	6.4	5.5	1.7
Beech	67.4	9.2	9.5	12.6	10.7	7.8	8.3	3.8	3.6	1.9	—
Ash	129.8	25.1	26.3	23.6	21.7	15.2	8.1	4.8	2.5	2.5	—
Basswood	119.3	9.8	17.4	22.7	14.8	14.7	19.1	13.0	3.1	4.7	—
Aspen	37.1	9.4	11.3	8.3	2.9	2.0	1.5	.7	.4	.6	—
Black cherry	55.9	7.5	11.1	7.1	13.1	6.5	3.2	3.6	1.9	1.9	—
Elm	130.9	16.3	19.2	19.7	19.4	13.6	16.1	10.2	3.2	10.4	2.8
Other hardwoods[1]	52.0	3.6	8.4	11.2	6.9	5.8	5.5	4.5	3.7	2.4	.4
Total hardwoods	1,269.5	186.4	223.5	227.5	182.1	150.5	111.0	84.7	41.9	51.4	10.5
All species	1,459.7	234.6	275.6	262.3	201.5	159.2	121.4	92.6	46.6	54.4	11.5

[1] Includes 5,000,000 cubic feet of oak (not select species) and 18,300,000 cubic feet of yellow-poplar.

Table 43.—*Sawtimber volume in the LAKE PLAIN UNIT, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	117.9	25.0	15.6	9.7	25.9	20.6	13.7	7.4	—
Red pine	51.4	46.6	4.8	—	—	—	—	—	—
Hemlock	150.1	28.1	36.2	23.3	18.8	16.5	11.1	9.7	6.4
Other softwoods	16.5	8.0	8.5	—	—	—	—	—	—
Total softwoods	335.9	107.7	65.1	33.0	44.7	37.1	24.8	17.1	6.4
Select white oaks	71.2	—	8.2	21.2	3.5	17.1	8.0	6.1	7.1
Select red oaks	191.5	—	29.4	47.7	24.0	25.1	8.4	39.9	17.0
Hickory	115.7	—	39.3	28.5	13.2	10.7	18.8	5.2	—
Yellow birch	25.0	—	8.3	8.6	1.6	—	3.3	3.2	—
Sugar maple	520.6	—	138.3	125.2	102.0	79.3	35.2	40.6	—
Soft maples	366.7	—	106.2	92.6	51.3	54.2	27.8	26.4	8.2
Beech	143.9	—	38.7	30.0	33.6	16.8	16.1	8.7	—
Ash	207.7	—	77.0	57.6	31.9	19.9	10.4	10.9	—
Basswood	275.8	—	52.9	56.0	76.8	55.7	13.4	21.0	—
Aspen	30.8	—	10.4	7.5	6.1	2.4	1.9	2.5	—
Black cherry	116.7	—	46.6	24.7	13.0	15.3	8.5	8.6	—
Yellow-poplar	45.0	—	12.7	7.5	7.9	8.4	4.2	4.3	—
Elm	299.3	—	68.5	51.3	63.6	43.3	13.7	47.0	11.9
Other hardwoods	69.4	—	12.1	13.9	13.2	10.4	11.3	6.5	2.0
Total hardwoods	2,479.3	—	648.6	572.3	441.7	358.6	181.0	230.9	46.2
All species	2,815.2	107.7	713.7	605.3	486.4	395.7	205.8	248.0	52.6

[1] International ¼-inch rule.

Table 44.—*Growing-stock volume in the SOUTHWEST HIGHLANDS UNIT, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	27.6	3.0	6.1	7.2	3.5	2.9	2.3	1.0	0.5	0.7	0.4
Red pine	49.6	28.0	13.4	4.6	2.5	.8	.3	—	—	—	—
Hemlock	117.0	23.6	27.7	18.9	16.4	11.0	7.7	5.1	3.8	2.3	.5
Other softwoods	9.6	3.8	5.0	.4	.4	—	—	—	—	—	—
Total softwoods	203.8	58.4	52.2	31.1	22.8	14.7	10.3	6.1	4.3	3.0	.9
Select white oaks	50.8	5.7	7.4	6.5	10.4	9.8	5.1	4.2	—	1.7	—
Select red oaks	138.7	6.0	15.8	26.4	27.2	26.3	16.5	11.9	6.6	2.0	—
Other oaks	15.7	1.1	3.9	4.9	2.3	1.4	1.3	.5	—	.3	—
Hickory	29.7	5.5	5.6	4.6	7.2	5.3	1.5	—	—	—	—
Yellow birch	14.6	2.3	3.4	4.1	2.8	1.2	.4	.4	—	—	—
Sugar maple	316.6	57.8	55.1	44.9	56.2	34.4	27.7	14.8	10.0	14.7	1.0
Soft maples	179.2	33.4	38.4	34.1	22.8	16.5	12.4	10.3	3.3	8.0	—
Beech	118.9	14.8	22.5	26.5	16.2	20.1	11.2	3.8	2.0	1.8	—
Ash	80.1	16.8	19.1	13.4	11.4	7.7	5.2	3.2	—	2.7	.6
Basswood	52.7	4.6	8.4	9.7	9.0	9.6	5.6	1.5	3.0	1.3	—
Aspen	50.1	12.5	19.5	10.6	6.0	.5	—	—	.6	—	.4
Black cherry	46.4	5.3	10.6	8.9	6.9	5.5	4.0	2.7	.9	1.6	—
Elm	38.5	5.0	4.5	6.3	4.4	7.1	3.6	1.6	1.8	2.3	1.9
Other hardwoods	29.5	7.8	8.0	3.9	4.0	.8	1.5	1.2	.4	1.5	.4
Total hardwoods	1,161.5	178.6	222.2	204.8	186.8	146.2	96.0	56.1	28.6	37.9	4.3
All species	1,365.3	237.0	274.4	235.9	209.6	160.9	106.3	62.2	32.9	40.9	5.2

Table 45.—*Sawtimber volume in the SOUTHWEST HIGHLANDS UNIT, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	65.4	20.7	10.9	10.1	9.6	5.0	2.6	4.0	2.5
Red pine	25.9	13.6	7.9	3.1	1.3	—	—	—	—
Hemlock	235.6	55.0	52.1	40.3	31.5	22.1	18.7	12.9	3.0
Other softwoods	2.4	1.1	1.3	—	—	—	—	—	—
Total softwoods	329.3	90.4	72.2	53.5	42.4	27.1	21.3	16.9	5.5
Select white oaks	112.6	—	34.7	34.6	18.9	16.8	—	7.6	—
Select red oaks	326.8	—	91.0	92.9	61.0	46.8	26.9	8.2	—
Other oaks	21.3	—	7.5	5.1	5.1	2.0	—	1.6	—
Hickory	47.9	—	23.7	18.6	5.6	—	—	—	—
Yellow birch	16.8	—	9.5	4.4	1.4	1.5	—	—	—
Sugar maple	579.4	—	188.0	122.7	104.0	59.2	39.9	61.7	3.9
Soft maples	272.5	—	77.0	59.5	46.8	40.6	13.8	34.8	—
Beech	203.4	—	55.1	73.2	43.0	15.4	8.6	8.1	—
Ash	112.4	—	38.3	28.0	19.8	12.9	—	11.0	2.4
Basswood	110.8	—	30.9	34.2	21.4	5.9	12.9	5.5	—
Aspen	26.0	—	20.2	1.9	—	—	2.2	—	1.7
Black cherry	78.7	—	23.3	19.1	14.8	11.0	3.9	6.6	—
Elm	85.3	—	14.9	25.3	13.6	6.7	7.3	9.3	8.2
Other hardwoods	36.8	—	13.0	2.8	5.7	5.1	1.7	6.7	1.8
Total hardwoods	2,030.7	—	627.1	522.3	361.1	223.9	117.2	161.1	18.0
All species	2,360.0	90.4	699.3	575.8	403.5	251.0	138.5	178.0	23.5

[1] International ¼-inch rule.

Table 46.—*Growing-stock volume in the SOUTH-CENTRAL HIGHLANDS UNIT, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	117.7	19.8	29.6	12.8	12.4	12.1	10.6	5.9	6.0	7.5	1.0
Red pine	62.9	16.8	15.1	17.5	9.8	2.0	.8	.9	—	—	—
Hemlock	209.4	38.4	37.8	33.1	37.9	22.4	17.6	12.3	6.5	2.9	.5
Other softwoods	19.0	7.0	4.5	4.1	3.4	—	—	—	—	—	—
Total softwoods	409.0	82.0	87.0	67.5	63.5	36.5	29.0	19.1	12.5	10.4	1.5
Select white oaks	18.1	2.1	1.4	2.7	5.2	1.9	2.3	.5	.5	.5	1.0
Select red oaks	140.8	10.5	23.3	23.8	19.0	17.6	23.2	7.5	6.1	9.3	.5
Other oaks	38.2	2.4	6.9	8.3	4.9	3.1	4.4	3.6	.6	4.0	—
Hickory	26.7	4.1	4.9	6.2	.7	5.4	2.7	—	1.3	1.4	—
Yellow birch	25.2	6.1	5.3	6.7	1.3	2.1	.2.1	.5	.4	.7	—
Sweet birch	36.3	12.9	9.2	8.3	3.8	—	1.7	—	.4	—	—
Sugar maple	418.6	63.1	72.9	90.4	78.6	54.5	18.3	15.2	10.4	11.2	4.0
Soft maples	369.0	81.4	81.0	89.0	52.5	27.5	18.5	10.2	3.2	4.6	1.1
Beech	143.2	16.3	28.2	21.9	33.6	20.0	12.1	7.3	2.9	.9	—
Ash	117.6	20.8	18.8	21.9	22.4	13.1	8.0	3.9	3.3	4.9	.5
Basswood	83.0	2.9	8.6	16.6	18.0	13.8	14.7	2.0	4.4	2.0	—
Aspen	67.3	16.6	21.4	17.3	6.7	4.1	1.2	—	—	—	—
Black cherry	38.6	5.7	6.8	6.9	5.2	6.1	2.6	2.0	1.5	1.8	—
Elm	38.7	4.1	5.3	6.2	4.4	2.3	3.5	3.3	2.6	4.8	2.2
Other hardwoods	20.7	3.7	2.2	3.9	2.7	2.8	.9	1.1	1.4	2.0	—
Total hardwoods	1,582.0	252.7	296.2	330.1	259.0	174.3	116.2	57.1	39.0	48.1	9.3
All species	1,991.0	334.7	383.2	397.6	322.5	210.8	145.2	76.2	51.5	58.5	10.8

Table 47.—*Sawtimber volume in the SOUTH-CENTRAL HIGHLANDS UNIT, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	260.4	35.8	38.5	42.8	41.3	25.2	28.9	41.9	6.0
Red pine	98.0	51.9	30.7	8.0	3.2	4.2	—	—	—
Hemlock	464.4	96.4	118.0	79.1	68.0	53.1	31.1	15.9	2.8
Other softwoods	22.8	12.1	10.7	—	—	—	—	—	—
Total softwoods	845.6	196.2	197.9	129.9	112.5	82.5	60.0	57.8	8.8
Select white oaks	42.3	—	17.1	6.3	8.6	1.9	2.0	2.3	4.1
Select red oaks	301.9	—	61.7	61.4	85.1	29.0	24.5	38.0	2.2
Other oaks	75.7	—	16.5	11.0	15.5	14.1	2.4	16.2	—
Hickory	41.7	—	2.2	18.7	9.9	—	5.2	5.7	—
Yellow birch	26.3	—	4.2	7.6	7.8	1.8	1.6	3.3	—
Sweet birch	20.4	—	12.5	—	6.3	—	1.6	—	—
Sugar maple	683.8	—	259.9	189.3	67.5	60.0	41.7	48.2	17.2
Soft maples	420.8	—	174.1	98.4	69.1	41.2	14.0	19.5	4.5
Beech	274.1	—	112.0	71.8	45.1	29.1	12.1	4.0	—
Ash	199.2	—	73.5	45.7	29.1	14.8	13.0	20.6	2.5
Basswood	197.3	—	59.5	49.0	54.3	8.3	17.6	8.6	—
Aspen	40.9	—	21.9	14.5	4.5	—	—	—	—
Black cherry	69.5	—	17.3	21.4	9.7	7.9	6.0	7.2	—
Elm	88.4	—	14.5	7.8	13.1	12.9	10.5	19.9	9.7
Other hardwoods	40.0	—	8.9	9.6	3.4	4.0	5.8	8.3	—
Total hardwoods	2,522.3	—	855.8	612.5	429.0	225.0	158.0	201.8	40.2
All species	3,367.9	196.2	1,053.7	742.4	541.5	307.5	218.0	259.6	49.0

[1] International ¼-inch rule.

Table 48.—*Growing-stock volume in the SOUTHWESTERN REGION, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	205.9	37.9	52.0	28.3	20.5	17.4	18.8	11.2	9.0	9.4	1.4
Red pine	146.9	54.5	37.0	36.9	13.7	2.8	1.1	.9	—	—	—
Hemlock	399.9	79.6	82.2	61.0	65.1	39.7	29.8	21.0	12.5	7.0	2.0
Other softwoods	50.3	16.6	20.1	7.2	6.4	—	—	—	—	—	—
Total softwoods	803.0	188.6	191.3	133.4	105.7	59.9	49.7	33.1	21.5	16.4	3.4
Select white oaks	92.7	10.6	9.8	11.3	17.9	17.3	8.3	8.9	2.3	3.6	2.7
Select red oaks	338.0	18.9	42.5	54.5	54.5	56.5	46.0	25.5	14.7	20.5	4.4
Other oaks	58.9	3.5	11.2	13.2	7.2	4.5	6.9	5.1	2.4	4.9	—
Hickory	139.2	29.3	30.2	24.1	19.0	18.2	7.5	2.6	5.6	2.7	—
Yellow birch	65.1	14.0	16.2	16.6	6.4	5.5	2.9	.9	1.2	1.4	—
Sweet birch	58.6	18.2	17.2	13.4	6.1	—	2.9	.4	.4	—	—
Sugar maple	1,010.3	159.9	179.5	186.3	173.7	122.0	71.7	48.8	28.6	34.8	5.0
Soft maples	759.8	150.8	157.0	168.9	105.0	67.9	43.5	32.9	12.9	18.1	2.8
Beech	329.5	40.3	60.2	61.0	60.5	47.9	31.6	14.9	8.5	4.6	—
Ash	327.5	62.7	64.2	58.9	55.5	36.0	21.3	11.9	5.8	10.1	1.1
Basswood	255.0	17.3	34.4	49.0	41.8	38.1	39.4	16.5	10.5	8.0	—
Aspen	154.5	38.5	52.2	36.2	15.6	6.6	2.7	.7	1.0	.6	.4
Black cherry	140.9	18.5	28.5	22.9	25.2	18.1	9.8	8.3	4.3	5.3	—
Elm	208.1	25.4	29.0	32.2	28.2	23.0	23.2	15.1	7.6	17.5	6.9
Other hardwoods	74.9	9.8	9.8	13.9	11.3	9.4	5.5	5.4	3.7	5.3	.8
Total hardwoods	4,013.0	617.7	741.9	762.4	627.9	471.0	323.2	197.9	109.5	137.4	24.1
All species	4,816.0	806.3	933.2	895.8	733.6	530.9	372.9	231.0	131.0	153.8	27.5

Table 49.—*Sawtimber volume in the SOUTHWESTERN REGION, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)						
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	443.7	81.5	65.0	62.6	76.8	50.8	45.2	53.3	8.5
Red pine	175.3	112.1	43.4	11.1	4.5	4.2	—	—	—
Hemlock	850.1	179.5	206.3	142.7	118.3	91.7	60.9	38.5	12.2
Other softwoods	41.7	21.2	20.5	—	—	—	—	—	—
Total softwoods	1,510.8	394.3	335.2	216.4	199.6	146.7	106.1	91.8	20.7
Select white oaks	226.1	—	60.0	62.1	31.0	35.8	10.0	16.0	11.2
Select red oaks	820.2	—	182.1	202.0	170.1	100.9	59.8	86.1	19.2
Other oaks	116.1	—	24.0	16.1	25.4	20.4	9.8	20.4	—
Hickory	205.3	—	65.2	65.8	28.7	10.7	24.0	10.9	—
Yellow birch	68.1	—	22.0	20.6	10.8	3.3	4.9	6.5	—
Sweet birch	34.6	—	20.5	—	10.7	1.8	1.6	—	—
Sugar maple	1,783.8	—	586.2	437.2	273.5	198.5	116.8	150.5	21.1
Soft maples	1,060.0	—	357.3	250.5	167.2	136.0	55.6	80.7	12.7
Beech	621.4	—	205.8	175.0	121.7	61.3	36.8	20.8	—
Ash	519.3	—	188.8	131.3	80.8	47.6	23.4	42.5	4.9
Basswood	583.9	—	143.3	139.2	152.5	69.9	43.9	35.1	—
Aspen	97.7	—	52.5	23.9	10.6	2.4	4.1	2.5	1.7
Black cherry	264.9	—	87.2	65.2	37.5	34.2	18.4	22.4	—
Elm	473.0	—	97.9	84.4	90.3	62.9	31.5	76.2	29.8
Other hardwoods	157.9	—	38.7	33.8	21.0	21.8	15.6	23.2	3.8
Total hardwoods	7,032.3	—	2,131.5	1,707.1	1,231.8	807.5	456.2	593.8	104.4
All species	8,543.1	394.3	2,466.7	1,923.5	1,431.4	954.2	562.3	685.6	125.1

[1] International ¼-inch rule.

Table 50.—*Growing-stock volume in the ST. LAWRENCE-NORTHERN ADIRONDACK UNIT, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	84.0	15.9	13.8	13.7	16.9	10.8	5.0	1.7	2.3	3.3	0.6
Red pine	59.1	20.9	13.3	8.7	10.0	3.5	2.1	—	.6	—	—
Spruce	130.6	47.9	29.4	25.8	18.0	6.6	1.7	1.2	—	—	—
Balsam fir	71.0	25.6	24.5	12.3	7.4	.6	.6	—	—	—	—
Hemlock	99.2	14.8	11.2	13.0	15.1	7.6	10.9	10.1	9.5	7.0	—
Other softwoods	75.8	24.2	21.8	14.6	5.4	5.4	2.1	1.1	1.2	—	—
Total softwoods	519.7	149.3	114.0	88.1	72.8	34.5	22.4	14.1	13.6	10.3	.6
Select red oaks	26.2	1.4	8.1	2.0	3.5	3.4	2.5	3.1	—	2.2	—
Yellow birch	84.5	11.7	12.4	10.8	12.7	9.0	8.1	10.8	4.3	3.9	.8
Paper birch	42.3	10.2	13.8	7.7	5.6	2.8	.8	.5	.5	.4	—
Sugar maple	329.0	61.5	61.3	63.0	43.7	34.1	21.1	20.3	10.2	13.2	.6
Soft maples	258.9	54.9	66.0	51.9	33.6	20.2	11.1	10.5	3.0	6.7	1.0
Beech	136.6	19.7	17.0	16.2	18.5	18.5	18.8	13.1	12.0	2.8	—
Ash	49.7	7.5	11.2	13.4	8.4	4.7	.4	1.5	1.5	1.1	—
Aspen	102.8	18.8	20.8	24.0	22.7	9.0	4.7	1.8	1.0	—	—
Basswood	47.7	3.3	6.6	11.6	8.3	7.0	5.9	.6	.6	3.0	.8
Black cherry	50.1	5.1	5.0	7.9	8.4	14.7	5.2	2.4	.9	.5	—
Elm	79.2	6.4	11.0	15.6	12.1	8.4	5.3	6.8	6.0	7.1	.5
Other hardwoods	17.1	5.3	1.1	1.8	.9	1.8	1.0	—	1.1	3.1	1.0
Total hardwoods	1,224.1	205.8	234.3	225.9	178.4	133.6	84.9	71.4	41.1	44.0	4.7
All species	1,743.8	355.1	348.3	314.0	251.2	168.1	107.3	85.5	54.7	54.3	5.3

Table 51.—*Sawtimber volume in the ST. LAWRENCE-NORTHERN ADIRONDACK UNIT, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	209.4	54.1	63.8	41.2	18.7	7.3	8.3	14.0	2.0
Red pine	100.5	35.3	41.5	13.7	7.7	—	2.3	—	—
Spruce	208.8	103.6	69.2	25.1	6.9	4.0	—	—	—
Balsam fir	87.9	52.3	30.7	2.5	2.4	—	—	—	—
Hemlock	304.9	52.8	58.0	27.5	42.1	42.2	45.4	36.9	—
Other softwoods	118.5	57.8	20.9	20.9	8.4	5.0	5.5	—	—
Total softwoods	1,030.0	355.9	284.1	130.9	86.2	58.5	61.5	50.9	2.0
Select red oaks	66.4	—	14.7	15.5	11.6	14.1	—	10.5	—
Yellow birch	227.3	—	52.5	39.9	38.0	50.3	21.6	21.2	3.8
Paper birch	47.1	—	23.6	12.6	3.9	2.4	2.7	1.9	—
Sugar maple	653.0	—	185.5	153.7	98.4	93.3	51.0	67.8	3.3
Soft maples	393.2	—	146.5	89.9	51.5	48.7	15.5	34.3	6.8
Beech	383.4	—	80.2	83.2	88.0	59.1	59.0	13.9	—
Ash	77.5	—	34.1	20.7	2.1	7.4	7.6	5.6	—
Aspen	174.4	—	98.7	40.1	22.3	7.7	5.6	—	—
Basswood	119.0	—	32.6	30.7	27.0	3.1	3.2	17.4	5.0
Black cherry	144.4	—	36.2	64.9	24.0	11.8	4.2	3.3	—
Elm	218.0	—	49.8	36.6	24.5	33.4	31.0	39.5	3.2
Other hardwoods	43.1	—	4.2	7.8	4.7	—	5.3	16.3	4.8
Total hardwoods	2,546.8	—	758.6	595.6	396.0	331.3	206.7	231.7	26.9
All species	3,576.8	355.9	1,042.7	726.5	482.2	389.8	268.2	282.6	28.9

[1] International ¼-inch rule.

Table 52.—*Growing-stock volume in the WESTERN ADIRONDACK UNIT, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	94.8	19.4	16.8	7.5	9.3	8.6	8.5	7.8	5.4	10.2	1.3
Red pine	32.2	8.7	13.2	8.5	1.6	—	.2	—	—	—	—
Spruce	119.6	34.1	20.0	18.2	15.6	11.6	10.0	5.1	2.8	2.2	—
Balsam fir	28.6	12.5	9.4	3.1	2.4	1.2	—	—	—	—	—
Hemlock	148.3	27.6	31.4	25.0	21.9	16.2	9.0	8.0	3.5	5.7	—
Other softwoods	27.8	10.7	11.4	3.1	1.1	.9	.6	—	—	—	—
Total softwoods	451.3	113.0	102.2	65.4	51.9	38.5	28.3	20.9	11.7	18.1	1.3
Select red oaks	25.4	2.1	3.1	6.7	5.3	4.0	1.5	.8	.7	1.2	—
Yellow birch	92.0	9.0	12.3	15.8	14.9	11.5	10.8	7.5	4.1	5.0	1.1
Sugar maple	173.6	26.9	32.6	31.5	22.6	18.8	14.3	10.6	5.8	10.2	.3
Soft maples	156.1	29.0	31.6	32.8	25.6	15.6	10.9	4.9	3.9	1.8	—
Beech	103.1	10.5	13.5	11.2	11.7	15.8	17.9	12.4	5.3	4.8	—
Ash	41.2	6.2	6.9	8.3	5.6	5.4	4.1	2.5	1.1	1.1	—
Aspen	42.4	6.1	8.9	9.7	7.0	5.2	2.9	1.9	.7	—	—
Basswood	15.9	.8	3.6	2.9	4.1	.8	1.5	.7	1.0	.5	—
Black cherry	52.3	6.1	7.0	9.0	8.5	8.6	6.8	3.9	1.1	1.3	—
Elm	37.9	5.3	3.4	4.2	5.4	5.1	3.6	1.4	3.5	3.9	2.1
Other hardwoods	24.6	5.0	6.0	3.3	2.0	2.3	1.4	1.7	.6	1.7	.6
Total hardwoods	764.5	107.0	128.9	135.4	112.7	93.1	75.7	48.3	27.8	31.5	4.1
All species	1,215.8	220.0	231.1	200.8	164.6	131.6	104.0	69.2	39.5	49.6	5.4

Table 53.—*Sawtimber volume in the WESTERN ADIRONDACK UNIT, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	246.3	31.0	37.5	34.0	33.5	31.7	24.4	47.4	6.8
Red pine	43.9	36.3	7.0	—	.6	—	—	—	—
Spruce	266.5	76.2	61.9	44.3	39.0	21.3	12.5	11.3	—
Balsam fir	27.8	13.2	10.2	4.4	—	—	—	—	—
Hemlock	363.5	101.0	85.3	61.7	34.7	35.2	16.7	28.9	—
Other softwoods	22.5	12.0	4.5	3.6	2.4	—	—	—	—
Total softwoods	970.5	269.7	206.4	148.0	110.2	88.2	53.6	87.6	6.8
Select red oaks	63.9	—	23.0	18.6	7.2	3.5	4.1	7.5	—
Yellow birch	255.8	—	64.2	51.4	51.3	35.2	21.5	26.1	6.1
Sugar maple	390.3	—	97.2	86.0	68.0	51.8	29.7	55.3	2.3
Soft maples	294.3	—	114.6	73.9	51.7	23.6	20.1	10.4	—
Beech	319.2	—	50.1	72.9	85.7	58.1	26.5	25.9	—
Ash	90.6	—	23.9	23.4	19.0	12.6	6.1	5.6	—
Aspen	80.6	—	30.5	23.6	13.9	8.8	3.8	—	—
Basswood	40.4	—	18.4	4.0	7.0	3.1	5.7	2.2	—
Black cherry	139.0	—	37.0	38.2	32.5	17.9	5.3	8.1	—
Elm	122.0	—	22.4	22.9	17.1	6.5	18.0	23.6	11.5
Other hardwoods	49.4	—	8.6	10.9	6.4	7.8	2.8	10.1	2.8
Total hardwoods	1,845.5	—	489.9	425.8	359.8	228.9	143.6	174.8	22.7
All species	2,816.0	269.7	696.3	573.8	470.0	317.1	197.2	262.4	29.5

[1] International ¼-inch rule.

Table 54.—*Growing-stock volume in the EASTERN ADIRONDACK UNIT, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	186.0	16.9	19.2	20.3	25.7	20.9	26.1	16.8	17.8	16.7	5.6
Red pine	11.4	1.1	.9	3.6	2.0	.5	1.8	—	1.0	.5	—
Spruce	169.9	43.2	31.2	28.4	15.3	18.7	12.8	11.4	6.0	2.9	—
Balsam fir	75.8	25.4	24.6	13.8	9.0	2.5	—	—	.5	—	—
Hemlock	124.7	15.8	18.4	16.7	23.4	17.3	9.6	6.6	4.8	10.7	1.4
Other softwoods	15.2	2.8	4.2	3.5	1.6	.4	2.7	—	—	—	—
Total softwoods	583.0	105.2	98.5	86.3	77.0	60.3	53.0	34.8	30.1	30.8	7.0
Select red oaks	65.8	10.9	10.6	17.0	10.3	6.2	4.6	3.8	.9	1.5	—
Yellow birch	107.7	7.4	10.7	16.2	14.2	19.3	12.1	7.9	6.4	11.0	2.5
Paper birch	76.6	11.2	17.3	17.2	11.9	11.5	3.0	2.9	1.2	.4	—
Sugar maple	192.1	23.7	20.8	29.6	26.9	29.7	20.9	18.9	7.4	12.9	1.3
Soft maples	75.9	16.2	16.9	16.6	8.1	5.0	7.2	2.1	1.8	2.0	—
Beech	118.6	12.9	16.3	20.9	17.6	18.2	14.3	9.5	4.4	4.5	—
Ash	28.8	4.2	3.9	7.4	7.8	2.1	2.1	.4	.9	—	—
Aspen	52.2	6.6	6.0	12.6	12.5	10.8	1.7	1.7	.3	—	—
Basswood	15.0	.9	2.4	3.8	2.6	1.9	.5	2.4	.5	—	—
Other hardwoods[1]	27.3	3.3	3.6	5.1	2.9	6.9	3.6	.4	.8	.7	—
Total hardwoods	760.0	97.3	108.5	146.4	114.8	111.6	70.0	50.0	24.6	33.0	3.8
All species	1,343.0	202.5	207.0	232.7	191.8	171.9	123.0	84.8	54.7	63.8	10.8

[1] Includes 7,900,000 cubic feet of black cherry and 7,100,000 cubic feet of elm.

Table 55.—*Sawtimber volume in the EASTERN ADIRONDACK UNIT, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	608.7	76.4	97.0	77.3	98.5	69.8	82.3	81.7	25.7
Red pine	37.5	14.2	8.1	1.9	6.7	—	3.7	2.9	—
Spruce	376.6	114.3	58.7	69.4	47.7	47.0	24.8	14.7	—
Balsam fir	102.9	56.5	35.5	9.2	—	—	1.7	—	—
Hemlock	357.6	64.8	86.5	62.1	36.7	28.1	21.7	51.0	6.7
Other softwoods	31.1	13.6	6.2	1.3	10.0	—	—	—	—
Total softwoods	1,514.4	339.8	292.0	221.2	199.6	144.9	134.2	150.3	32.4
Select red oaks	119.9	—	42.3	26.7	21.1	17.9	4.5	7.4	—
Yellow birch	336.3	—	58.0	84.4	55.1	36.0	32.8	57.3	12.7
Paper birch	132.3	—	48.0	49.6	13.6	13.3	6.2	1.6	—
Sugar maple	537.7	—	116.2	132.6	96.3	85.6	34.9	64.1	8.0
Soft maples	116.9	—	34.9	22.2	32.9	8.8	8.5	9.6	—
Beech	306.5	—	73.0	81.9	65.7	42.1	20.8	23.0	—
Ash	57.2	—	32.4	8.9	9.2	1.9	4.8	—	—
Aspen	117.5	—	52.4	48.0	7.9	7.6	1.6	—	—
Basswood	34.8	—	11.2	8.3	2.3	10.2	2.8	—	—
Other hardwoods[2]	68.6	—	12.4	29.5	16.6	1.9	4.2	4.0	—
Total hardwoods	1,827.7	—	480.8	492.1	320.7	225.3	121.1	167.0	20.7
All species	3,342.1	339.8	772.8	713.3	520.3	370.2	255.3	317.3	53.1

[1] International ¼-inch rule.
[2] Includes 21,000,000 board feet of black cherry and 14,500,000 board feet of elm.

Table 56.—*Growing-stock volume in the NORTHERN REGION, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	364.8	52.2	49.8	41.5	51.9	40.3	39.6	26.3	25.5	30.2	7.5
Red pine	102.7	30.7	27.4	20.8	13.6	4.0	4.1	—	1.6	.5	—
Spruce	428.0	129.1	82.2	74.8	48.9	36.9	24.5	17.7	8.8	5.1	—
Balsam fir	175.4	63.5	58.5	29.2	18.8	4.3	.6	—	.5	—	—
Hemlock	372.2	58.2	61.0	54.7	60.4	41.1	29.5	24.7	17.8	23.4	1.4
Other softwoods	110.9	33.8	35.8	18.8	8.1	6.7	5.4	1.1	1.2	—	—
Total softwoods	1,554.0	367.5	314.7	239.8	201.7	133.3	103.7	69.8	55.4	59.2	8.9
Select red oaks	117.4	14.4	21.8	25.7	19.1	13.6	8.6	7.7	1.6	4.9	—
Yellow birch	281.1	28.1	34.9	41.6	40.4	39.8	31.0	26.2	14.8	19.9	4.4
Paper birch	121.8	21.5	31.9	25.9	17.9	14.9	3.8	3.4	1.7	.8	—
Sugar maple	694.7	112.1	114.7	124.1	93.2	82.6	56.3	49.8	23.4	36.3	2.2
Soft maples	490.9	100.1	114.5	101.3	67.3	40.8	29.2	17.5	8.7	10.5	1.0
Beech	358.3	43.1	46.8	48.3	47.8	52.5	51.0	35.0	21.7	12.1	—
Ash	119.7	17.9	22.0	29.1	21.8	12.2	6.6	4.4	3.5	2.2	—
Aspen	197.4	31.5	35.7	46.3	42.2	25.0	9.3	5.4	2.0	—	—
Basswood	78.6	5.0	12.6	18.3	15.0	9.7	7.9	3.7	2.1	3.5	.8
Black cherry	110.3	12.8	12.9	17.8	18.1	24.6	13.7	6.3	2.0	2.1	—
Elm	124.2	12.2	15.4	22.2	17.9	15.1	9.7	8.2	9.5	11.4	2.6
Other hardwoods	54.2	11.4	8.5	7.1	5.2	7.5	3.5	2.1	2.5	4.8	1.6
Total hardwoods	2,748.6	410.1	471.7	507.7	405.9	338.3	230.6	169.7	93.5	108.5	12.6
All species	4,302.6	777.6	786.4	747.5	607.6	471.6	334.3	239.5	148.9	167.7	21.5

Table 57.—*Sawtimber volume in the NORTHERN REGION, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	1,064.4	161.5	198.3	152.5	150.7	108.8	115.0	143.1	34.5
Red pine	181.9	85.8	56.6	15.6	15.0	—	6.0	2.9	—
Spruce	861.4	303.6	189.8	138.8	93.6	72.3	37.3	26.0	—
Balsam fir	218.6	122.0	76.4	16.1	2.4	—	1.7	—	—
Hemlock	1,026.0	218.6	229.8	151.3	113.5	105.5	83.8	116.8	6.7
Other softwoods	162.6	73.9	31.6	25.8	20.8	5.0	5.5	—	—
Total softwoods	3,514.9	965.4	782.5	500.1	396.0	291.6	249.3	288.8	41.2
Select red oaks	250.2	—	80.0	60.8	39.9	35.5	8.6	25.4	—
Yellow birch	814.1	—	169.4	175.7	144.4	121.5	75.9	104.6	22.6
Paper birch	183.7	—	73.3	64.8	17.5	15.7	8.9	3.5	—
Sugar maple	1,581.0	—	398.9	372.3	262.7	230.7	115.6	187.2	13.6
Soft maples	804.4	—	296.0	186.0	136.1	81.1	44.1	54.3	6.8
Beech	1,009.1	—	203.3	238.0	239.4	159.3	106.3	62.8	—
Ash	225.3	—	90.4	53.0	30.3	21.9	18.5	11.2	—
Aspen	372.5	—	181.6	111.7	44.1	24.1	11.0	—	—
Basswood	194.2	—	62.2	43.0	36.3	16.4	11.7	19.6	5.0
Black cherry	304.4	—	78.9	108.9	64.5	29.7	9.5	12.9	—
Elm	354.5	—	73.6	66.5	45.2	39.9	49.0	65.6	14.7
Other hardwoods	126.6	—	21.7	32.8	16.1	9.7	12.3	26.4	7.6
Total hardwoods	6,220.0	—	1,729.3	1,513.5	1,076.5	785.5	471.4	573.5	70.3
All species	9,734.9	965.4	2,511.8	2,013.6	1,472.5	1,077.1	720.7	862.3	111.5

[1] International ¼-inch rule.

Table 58.—*Growing-stock volume in the CAPITOL DISTRICT UNIT, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	215.4	25.2	32.7	29.7	31.5	33.9	19.2	13.7	9.7	14.2	5.6
Red pine	35.0	12.5	15.5	5.7	.4	.3	.3	.3	—	—	—
Hemlock	136.8	26.7	23.8	31.3	21.0	14.3	10.0	6.6	1.7	1.4	—
Other softwoods	21.1	4.0	4.1	3.2	6.2	2.1	1.1	—	—	.4	—
Total softwoods	408.3	68.4	76.1	69.9	59.1	50.6	30.6	20.6	11.4	16.0	5.6
Select white oaks	27.0	1.2	2.8	2.2	3.7	3.5	4.4	3.6	1.9	3.2	.5
Select red oaks	102.2	10.3	11.2	13.7	16.4	16.9	12.0	6.6	5.7	8.0	1.4
Other oaks	35.4	1.8	4.9	6.7	9.8	3.2	4.2	2.0	.7	2.1	—
Hickory	28.7	4.8	6.3	6.0	4.8	3.8	1.0	1.3	.3	.4	—
Yellow birch	16.0	2.2	2.5	2.9	2.4	2.1	1.9	.7	.8	.5	—
Sweet birch	13.2	4.6	2.7	2.9	1.4	.8	.5	—	—	.3	—
Sugar maple	136.1	23.8	23.8	24.7	23.2	15.9	8.9	8.5	3.6	3.1	.6
Soft maples	90.2	22.8	20.8	20.4	12.4	7.3	2.3	2.4	.7	1.1	—
Beech	32.8	5.6	5.4	7.5	3.8	6.3	2.5	.9	.5	.3	—
Ash	50.2	9.0	9.8	11.7	7.2	7.0	2.5	1.3	.7	.7	.3
Basswood	20.7	2.4	3.5	2.7	4.5	3.9	1.1	1.6	1.0	—	—
Aspen	36.0	7.6	11.5	8.6	3.4	1.1	1.1	—	.7	1.2	.8
Black cherry	16.1	3.1	4.7	4.1	2.6	1.3	.3	—	—	—	—
Other hardwoods	86.2	16.6	21.0	18.2	13.5	8.5	2.5	1.2	1.1	2.8	.8
Total hardwoods	690.8	115.8	130.9	132.3	109.1	81.6	45.2	30.1	17.7	23.7	4.4
All species	1,099.1	184.2	207.0	202.2	168.2	132.2	75.8	50.7	29.1	39.7	10.0

Table 59.—*Sawtimber volume in the CAPITOL DISTRICT UNIT, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	603.6	98.7	110.2	124.7	74.6	56.8	42.9	68.1	27.6
Red pine	23.8	19.0	1.2	1.2	1.2	1.2	—	—	—
Hemlock	316.9	107.3	74.1	53.8	39.1	28.2	7.6	6.8	—
Other softwoods	47.5	11.3	22.1	8.1	3.8	—	—	2.2	—
Total softwoods	991.8	236.3	207.6	187.8	118.7	86.2	50.5	77.1	27.6
Select white oaks	86.1	—	12.7	13.3	17.7	15.7	8.4	15.7	2.6
Select red oaks	270.9	—	57.2	64.0	49.7	28.6	25.7	38.7	7.0
Other oaks	84.5	—	34.1	11.8	16.9	8.4	3.1	10.2	—
Hickory	44.1	—	17.0	14.6	4.0	5.5	1.2	1.8	—
Yellow birch	33.3	—	8.6	8.0	7.7	3.1	3.7	2.2	—
Sweet birch	11.4	—	5.1	2.9	2.2	—	—	1.2	—
Sugar maple	247.3	—	80.9	60.2	36.2	36.7	16.1	14.3	2.9
Soft maples	98.9	—	43.3	27.3	9.3	10.1	3.5	5.4	—
Beech	55.2	—	13.3	23.7	10.3	3.9	2.4	1.6	—
Ash	75.3	—	24.9	26.3	10.1	5.7	3.5	3.1	1.7
Basswood	45.1	—	15.4	14.6	4.3	6.4	4.4	—	—
Aspen	33.0	—	11.7	4.4	4.3	—	2.9	6.1	3.6
Black cherry	15.0	—	9.0	4.7	1.3	—	—	—	—
Other hardwoods	116.9	—	47.0	32.6	9.9	5.1	5.2	13.2	3.9
Total hardwoods	1,217.0	—	380.2	308.4	183.9	129.2	80.1	113.5	21.7
All species	2,208.8	236.3	587.8	496.2	302.6	215.4	130.6	190.6	49.3

[1] International ¼-inch rule.

Table 60.—*Growing-stock volume in the CATSKILL-LOWER HUDSON UNIT, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	164.5	21.4	21.6	24.8	22.7	15.2	16.2	14.4	9.2	17.5	1.5
Red pine	42.7	18.7	19.4	4.1	.5	—	—	—	—	—	—
Hemlock	173.1	40.7	29.6	28.4	21.6	19.0	12.2	7.2	7.3	6.1	1.0
Other softwoods	35.1	8.3	12.0	10.1	3.7	.4	—	—	.6	—	—
Total softwoods	415.4	89.1	82.6	67.4	48.5	34.6	28.4	21.6	17.1	23.6	2.5
Select white oaks	119.2	15.4	15.4	20.8	16.7	14.2	11.1	9.9	4.5	6.4	4.8
Select red oaks	260.6	18.9	36.7	47.9	41.6	31.6	27.8	22.1	12.7	20.2	1.1
Other oaks	263.6	27.3	54.5	59.5	39.9	31.8	25.6	11.6	4.8	8.6	—
Hickory	74.3	14.1	17.1	11.8	12.1	8.2	5.4	4.3	—	1.3	—
Yellow birch	34.4	4.5	11.0	8.7	3.9	4.0	.7	1.3	—	—	.3
Sweet birch	61.5	13.6	12.5	15.2	10.9	5.8	2.1	1.4	—	—	—
Sugar maple	156.1	39.1	31.6	21.7	15.6	20.4	15.0	4.4	4.0	3.3	1.0
Soft maples	273.7	61.9	65.1	57.4	37.1	21.2	14.5	7.4	3.3	5.1	.7
Beech	59.8	11.3	9.8	13.0	8.4	7.6	5.5	2.4	.6	1.2	—
Ash	102.9	20.7	24.8	22.0	10.9	8.5	7.8	2.7	2.9	2.1	.5
Basswood	31.3	3.0	4.2	7.6	6.6	4.2	2.4	.6	2.1	.6	—
Aspen	26.6	4.1	6.1	5.9	3.6	3.3	2.3	.6	—	.7	—
Black cherry	48.8	4.5	6.9	10.5	11.4	6.2	4.9	2.3	1.5	.6	—
Other hardwoods	53.9	8.5	8.2	9.4	4.2	6.0	5.6	2.8	3.2	5.6	.4
Total hardwoods	1,566.7	246.9	303.9	311.4	222.9	173.0	130.7	73.8	39.6	55.7	8.8
All species	1,982.1	336.0	386.5	378.8	271.4	207.6	159.1	95.4	56.7	79.3	11.3

Table 61.—*Sawtimber volume in the CATSKILL-LOWER HUDSON UNIT, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	497.0	86.5	83.3	58.2	66.2	62.8	43.0	88.9	8.1
Red pine	16.5	14.6	1.9	—	—	—	—	—	—
Hemlock	413.6	102.0	83.8	75.7	50.5	31.3	34.6	30.8	4.9
Other softwoods	54.2	36.1	13.9	1.6	—	—	2.6	—	—
Total softwoods	981.3	239.2	182.9	135.5	116.7	94.1	80.2	119.7	13.0
Select white oaks	292.0	—	61.8	57.3	48.1	45.5	21.8	32.7	24.8
Select red oaks	674.8	—	154.6	128.6	120.8	101.8	61.3	102.5	5.2
Other oaks	507.3	—	147.6	128.2	111.3	53.0	23.1	44.1	—
Hickory	128.5	—	44.9	33.6	23.3	19.9	—	6.8	—
Yellow birch	40.5	—	14.1	16.0	3.0	5.9	—	—	1.5
Sweet birch	78.6	—	40.0	23.5	8.9	6.2	—	—	—
Sugar maple	264.1	—	57.8	81.0	64.0	19.7	19.4	16.9	5.3
Soft maples	361.0	—	136.5	84.6	61.7	33.4	15.5	26.0	3.3
Beech	103.7	—	31.2	30.0	23.0	10.7	2.8	6.0	—
Ash	147.1	—	40.1	34.5	33.3	12.2	13.6	10.6	2.8
Basswood	68.0	—	24.7	16.8	10.4	2.9	10.0	3.2	—
Aspen	43.0	—	13.3	13.5	10.2	2.9	—	3.1	—
Black cherry	108.2	—	41.8	24.8	20.9	10.5	7.3	2.9	—
Other softwoods	123.5	—	15.4	23.7	24.9	12.9	15.5	28.8	2.3
Total softwoods	2,940.3	—	823.8	696.1	563.8	337.5	190.3	283.6	45.2
All species	3,921.6	239.2	1,006.7	831.6	680.5	431.6	270.5	403.3	58.2

[1] International ¼-inch rule.

Table 62.—*Growing-stock volume in the SOUTHEASTERN REGION, by species and diameter class, 1968*

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	379.9	46.6	54.3	54.5	54.2	49.1	35.4	28.1	18.9	31.7	7.1
Red pine	77.7	31.2	34.9	9.8	.9	.3	.3	.3	—	—	—
Hemlock	309.9	67.4	53.4	59.7	42.6	33.3	22.2	13.8	9.0	7.5	1.0
Other softwoods	56.2	12.3	16.1	13.3	9.9	2.5	1.1	—	.6	.4	—
Total softwoods	823.7	157.5	158.7	137.3	107.6	85.2	59.0	42.2	28.5	39.6	8.1
Select white oaks	146.2	16.6	18.2	23.0	20.4	17.7	15.5	13.5	6.4	9.6	5.3
Select red oaks	362.8	29.2	47.9	61.6	58.0	48.5	39.8	28.7	18.4	28.2	2.5
Other oaks	299.0	29.1	59.4	66.2	49.7	35.0	29.8	13.6	5.5	10.7	—
Hickory	103.0	18.9	23.4	17.8	16.9	12.0	6.4	5.6	.3	1.7	—
Yellow birch	50.4	6.7	13.5	11.6	6.3	6.1	2.6	2.0	.8	.5	.3
Sweet birch	74.7	18.2	15.2	18.1	12.3	6.6	2.6	1.4	—	.3	—
Sugar maple	292.2	62.9	55.4	46.4	38.8	36.3	23.9	12.9	7.6	6.4	1.6
Soft maples	363.9	84.7	85.9	77.8	49.5	28.5	16.8	9.8	4.0	6.2	.7
Beech	92.6	16.9	15.2	20.5	12.2	13.9	8.0	3.3	1.1	1.5	—
Ash	153.1	29.7	34.6	33.7	18.1	15.5	10.3	4.0	3.6	2.8	.8
Basswood	52.0	5.4	7.7	10.3	11.1	8.1	3.5	2.2	3.1	.6	—
Aspen	62.6	11.7	17.6	14.5	7.0	4.4	3.4	.6	.7	1.9	.8
Black cherry	64.9	7.6	11.6	14.6	14.0	7.5	5.2	2.3	1.5	.6	—
Other hardwoods	140.1	25.1	29.2	27.6	17.7	14.5	8.1	4.0	4.3	8.4	1.2
Total hardwoods	2,257.5	362.7	434.8	443.7	332.0	254.6	175.9	103.9	57.3	79.4	13.2
All species	3,081.2	520.2	593.5	581.0	439.6	339.8	234.9	146.1	85.8	119.0	21.3

Table 63.—*Sawtimber volume in the SOUTHEASTERN REGION, by species and diameter class, 1968*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 and larger
White pine	1,100.6	185.2	193.5	182.9	140.8	119.6	85.9	157.0	35.7
Red pine	40.3	33.6	3.1	1.2	1.2	1.2	—	—	—
Hemlock	730.5	209.3	157.9	129.5	89.6	59.5	42.2	37.6	4.9
Other softwoods	101.7	47.4	36.0	9.7	3.8	—	2.6	2.2	—
Total softwoods	1,973.1	475.5	390.5	323.3	235.4	180.3	130.7	196.8	40.6
Select white oaks	378.1	—	74.5	70.6	65.8	61.2	30.2	48.4	27.4
Select red oaks	945.7	—	211.8	192.6	170.5	130.4	87.0	141.2	12.2
Other oaks	591.8	—	181.7	140.0	128.2	61.4	26.2	54.3	—
Hickory	172.6	—	61.9	48.2	27.3	25.4	1.2	8.6	—
Yellow birch	73.8	—	22.7	24.0	10.7	9.0	3.7	2.2	1.5
Sweet birch	90.0	—	45.1	26.4	11.1	6.2	—	1.2	—
Sugar maple	511.4	—	138.7	141.2	100.2	56.4	35.5	31.2	8.2
Soft maples	459.9	—	179.8	111.9	71.0	43.5	19.0	31.4	3.3
Beech	158.9	—	44.5	53.7	33.3	14.6	5.2	7.6	—
Ash	222.4	—	65.0	60.8	43.4	17.9	17.1	13.7	4.5
Basswood	113.1	—	40.1	31.4	14.7	9.3	14.4	3.2	—
Aspen	76.0	—	25.0	17.9	14.5	2.9	2.9	9.2	3.6
Black cherry	123.2	—	50.8	29.5	22.2	10.5	7.3	2.9	—
Other hardwoods	240.4	—	62.4	56.3	34.8	18.0	20.7	42.0	6.2
Total hardwoods	4,157.3	—	1,204.0	1,004.5	747.7	466.7	270.4	397.1	66.9
All species	6,130.4	475.5	1,594.5	1,327.8	983.1	647.0	401.1	593.9	107.5

[1] International ¼-inch rule.

Table 64.—*Sampling errors for growing-stock (G) and sawtimber (S) volume by species, geographic unit, and region, 1968*

(In percent)

Species	Lake Plain		Southwest Highlands		S.-central Highlands		SW. Region total		St. Lawrence-N. Adirondack		Western Adirondack	
	G.	S.	G.	S.	G.	S.	G.	S.	G.	S.	G.	S.
White pine	33	42	32	31	20	23	16	18	22	25	24	23
Red pine	(*)	(*)	50	(*)	33	39	25	29	37	45	(*)	(*)
Spruce	—	—	—	—	—	—	—	—	16	16	13	17
Balsam fir	—	—	—	—	—	—	—	—	21	27	22	35
Hemlock	16	18	17	17	13	14	9	10	27	30	12	13
Other softwoods	45	(*)	45	(*)	41	50	26	39	27	34	(*)	(*)
All softwoods	17	21	16	15	10	11	8	9	8	11	7	9
Select white oaks	24	27	21	25	26	25	14	16	—	—	—	—
Select red oaks	30	30	17	19	15	16	11	12	33	31	33	31
Other oaks	—	—	36	37	30	35	22	26	—	—	—	—
Hickory	16	23	23	27	31	38	12	16	—	—	—	—
Yellow birch	20	28	22	31	18	28	11	17	14	19	11	14
Sweet birch	—	—	—	—	16	26	12	21	—	—	—	—
Paper birch	—	—	—	—	—	—	—	—	20	33	—	—
Sugar maple	11	13	11	14	9	11	6	7	9	11	11	12
Soft maples	12	16	14	19	9	13	6	9	10	14	10	13
Beech	15	19	14	17	11	14	8	9	11	13	12	13
Ash	13	16	14	21	12	14	7	10	17	26	17	22
Basswood	18	21	19	22	15	18	11	12	22	25	23	26
Aspen	19	31	17	32	17	30	11	18	14	18	27	41
Black cherry	20	23	20	23	18	22	11	14	16	22	15	17
Elm	11	13	16	19	21	30	9	14	14	17	21	27
Other hardwoods	23	24	29	42	35	50	17	21	26	42	34	45
All hardwoods	4	5	4	5	4	5	2	3	4	5	5	5
All species	3	4	3	4	3	4	2	2	2	3	2	3

Continued

Table 64.—*Continued.*

Species	Eastern Adirondack		N. Region total		Capitol District		Catskill-Lower Hudson		SE. Region total		State total	
	G.	S.	G.	S.	G.	S.	G.	S.	G.	S.	G.	S.
White pine	14	15	11	11	12	12	17	18	10	11	7	7
Red pine	38	36	27	29	42	41	(*)	47	36	31	16	19
Spruce	12	15	8	9	—	—	—	—	—	—	8	9
Balsam fir	16	21	12	15	—	—	—	—	—	—	11	17
Hemlock	14	15	10	11	14	14	13	15	9	11	5	6
Other softwoods	40	48	22	25	45	45	(*)	40	40	35	16	19
All softwoods	6	7	4	5	4	8	4	11	6	7	3	4
Select white oaks	—	—	—	—	20	24	11	14	10	12	8	9
Select red oaks	21	28	16	18	11	13	10	11	8	9	6	7
Other oaks	—	—	—	—	15	28	12	15	11	13	10	12
Hickory	—	—	—	—	18	25	14	19	12	16	8	11
Yellow birch	11	13	7	9	20	24	18	33	14	21	6	8
Sweet birch	—	—	—	—	19	32	14	20	12	18	9	14
Paper birch	15	20	12	17	—	—	—	—	—	—	9	15
Sugar maple	11	12	6	7	11	15	10	13	8	10	4	5
Soft maples	13	22	6	9	11	19	9	12	7	10	4	6
Beech	12	13	7	8	17	22	17	20	13	15	5	6
Ash	19	25	10	14	14	22	12	17	10	13	5	7
Basswood	26	33	15	18	21	26	21	27	15	19	8	9
Aspen	23	31	11	16	20	33	21	34	14	26	7	12
Black cherry	30	36	10	13	21	35	22	24	17	22	7	9
Elm	38	41	11	14	—	—	—	—	—	—	6	8
Other hardwoods	12	16	18	19	18	21	21	30	14	17	16	21
All hardwoods	5	6	3	3	4	7	4	5	3	4	1	2
All species	3	3	1	2	3	4	2	3	2	2	1	1

Table 65.—*Volume of sawtimber in the LAKE PLAIN UNIT, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	117.9	3.9	16.1	60.9	37.0
Red pine	51.4	—	.3	24.4	26.7
Other softwoods[3]	166.6	—	—	—	—
Total softwoods	335.9	3.9	16.4	85.3	63.7
Select white oaks	71.2	10.9	16.6	27.3	16.4
Select red oaks	191.5	58.4	37.9	65.2	30.0
Hickory	115.7	3.4	15.1	46.4	50.8
Yellow birch	25.0	2.4	6.4	11.0	5.2
Sugar maple	520.6	62.5	104.2	277.1	76.8
Soft maples	366.7	19.5	58.0	193.8	95.4
Beech	143.9	4.4	15.5	95.2	28.8
White ash	207.7	31.1	46.0	92.6	38.0
Basswood	275.8	39.6	73.3	133.3	29.6
Aspen	30.8	1.6	2.7	11.8	14.7
Black cherry	116.7	7.8	18.2	63.4	27.3
Yellow-poplar	45.0	4.8	3.2	18.8	18.2
Elm	299.3	43.7	76.3	136.5	42.8
Other hardwoods	69.4	7.8	12.4	40.7	8.5
Total hardwoods	2,479.3	297.9	485.8	1,213.1	482.5

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for onstruction logs.

[3] Species other than pines were not graded into standard-lumber log grades.

Table 66.—*Volume of sawtimber in the SOUTHWEST HIGHLANDS UNIT, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	65.4	2.9	13.2	32.2	17.1
Red pine	25.9	—	.7	17.5	7.7
Other softwoods[3]	238.0	—	—	—	—
Total softwoods	329.3	2.9	13.9	49.7	24.8
Select white oaks	112.6	20.2	32.1	46.6	13.7
Select red oaks	326.8	36.0	65.5	138.1	87.2
Other oaks	21.3	2.2	.1	12.9	6.1
Hickory	47.9	—	5.8	23.9	18.2
Yellow birch	16.8	1.2	2.4	10.9	2.3
Sugar maple	579.4	68.2	153.6	230.9	126.7
Soft maples	272.5	27.4	43.4	104.1	97.6
Beech	203.4	2.0	21.8	109.5	70.1
White ash	112.4	19.9	34.1	43.2	15.2
Basswood	110.8	14.8	31.5	46.8	17.7
Aspen	26.0	1.1	.4	14.4	10.1
Black cherry	78.7	13.6	12.5	36.8	15.8
Elm	85.3	13.7	25.2	34.2	12.2
Other hardwoods	36.8	.1	5.2	17.3	14.2
Total hardwoods	2,030.7	220.4	433.6	869.6	507.1

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.

[3] Species other than pines were not graded into standard-lumber log grades.

Table 67.—*Voume of sawtimber in the SOUTH-CENTRAL HIGHLANDS UNIT, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	260.4	4.8	10.7	113.2	131.7
Red pine[3]	100.7	.9	1.2	71.0	27.6
Other softwoods[4]	484.5	—	—	—	—
Total softwoods	845.6	5.7	11.9	184.2	159.3
Select white oaks	42.3	8.4	6.8	19.9	7.2
Select red oaks	301.9	56.9	71.0	111.1	62.9
Other oaks	75.7	10.0	17.0	29.4	19.3
Hickory	41.7	—	8.6	16.8	16.3
Yellow birch	26.3	1.3	5.2	16.9	2.9
Sweet birch	20.4	1.3	3.9	14.1	1.1
Sugar maple	683.8	74.2	137.6	338.7	133.3
Soft maples	420.8	12.3	65.5	234.0	109.0
Beech	274.1	6.5	33.0	177.7	56.9
White ash	199.2	39.0	46.0	66.0	48.2
Basswood	197.3	25.7	57.8	95.8	18.0
Aspen	40.9	—	5.9	19.5	15.5
Black cherry	69.5	4.9	16.5	27.4	20.7
Elm	88.4	14.0	15.5	30.1	28.8
Other hardwoods	40.0	3.4	2.6	20.9	13.1
Total hardwoods	2,522.3	257.9	492.9	1,218.3	553.2

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for onstruction logs.

[3] Includes 2,700,000 board feet of yellow pine.

[4] Species other than pine were not graded into standard-lumber log grades.

Table 68.—*Volume of sawtimber in the SOUTHWESTERN REGION, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	443.7	11.6	40.0	206.3	185.8
Red pine[3]	178.0	.9	2.2	112.9	62.0
Other softwoods[4]	889.1	—	—	—	—
Total softwoods	1,510.8	12.5	42.2	319.2	247.8
Select white oaks	226.1	39.5	55.5	93.8	37.3
Select red oaks	820.2	151.3	174.4	314.4	180.1
Other oaks	116.1	18.6	21.3	49.7	26.5
Hickory	205.3	3.4	29.5	87.1	85.3
Yellow birch	68.1	4.9	14.0	38.8	10.4
Sweet birch	34.6	1.5	6.3	21.1	5.7
Sugar maple	1,783.8	204.9	395.4	846.7	336.8
Soft maples	1,060.0	59.2	166.9	531.9	302.0
Beech	621.4	12.9	70.3	382.4	155.8
White ash	519.3	90.0	126.1	201.8	101.4
Basswood	583.9	80.1	162.6	275.9	65.3
Aspen	85.1	1.6	7.6	38.9	37.0
Black cherry	264.9	26.3	47.2	127.6	63.8
Elm	473.0	71.4	117.0	200.8	83.8
Other hardwoods	170.5	10.6	18.2	90.1	51.6
Total hardwoods	7,032.3	776.2	1,412.3	3,301.0	1,542.8

[1] International ¼-inch rule.
[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.
[3] Includes a small volume of yellow pine.
[4] Species other than pine were not graded into standard-lumber log grades.

Table 69.—*Volume of sawtimber in the ST. LAWRENCE-NORTHERN ADIRONDACK UNIT, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	209.4	3.1	18.5	79.0	108.8
Red pine	100.5	1.7	.8	71.1	26.9
Other softwoods[3]	720.1	—	—	—	—
Total softwoods	1,030.0	4.8	19.3	150.1	135.7
Select red oaks	66.4	12.5	12.4	36.3	5.2
Yellow birch	227.3	39.8	62.2	111.0	14.3
Paper birch	47.1	6.7	6.9	30.9	2.6
Sugar maple	653.0	132.2	160.7	293.3	66.8
Soft maples	393.2	56.1	72.3	212.9	51.9
Beech	383.4	34.6	76.2	240.2	32.4
White ash	77.5	10.8	21.7	32.9	12.1
Aspen	174.4	10.5	22.7	95.8	45.4
Basswood	119.0	13.8	33.6	63.0	8.6
Black cherry	144.4	13.7	35.8	62.4	32.5
Elm	218.0	47.3	57.0	89.4	24.3
Other hardwoods	43.1	5.3	7.2	14.8	15.8
Total hardwoods	2,546.8	383.3	568.7	1,282.9	311.9

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.

[3] Species other than pines were not graded into standard-lumber log grades.

Table 70.—*Volume of sawtimber in the WESTERN ADIRONDACK UNIT, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	246.3	5.7	18.0	108.2	114.4
Red pine	43.9	—	3.0	30.5	10.4
Other softwoods[3]	680.3	—	—	—	—
Total softwoods	970.5	5.7	21.0	138.7	124.8
Select red oaks	63.9	11.4	14.4	33.1	5.0
Yellow birch	255.8	37.2	68.1	134.7	15.8
Sugar maple	390.3	63.4	94.8	189.0	43.1
Soft maples	294.3	15.8	60.4	181.1	37.0
Beech	319.2	20.0	69.2	197.3	32.7
White ash	90.6	15.7	25.7	35.2	14.0
Aspen	80.6	2.3	13.9	45.7	18.7
Basswood	40.4	5.0	6.8	25.5	3.1
Black cherry	139.0	15.0	24.5	66.1	33.4
Elm	122.0	31.6	37.8	42.7	9.9
Other hardwoods	49.4	2.3	8.0	31.9	7.2
Total hardwoods	1,845.5	219.7	423.6	982.3	219.9

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.

[3] Species other than pines were not graded into standard-lumber log grades.

Table 71.—Volume of sawtimber in the EASTERN ADIRONDACK UNIT, *by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	608.7	6.3	42.6	306.9	252.9
Red pine	37.5	—	.1	23.8	13.6
Other softwoods[3]	868.2	—	—	—	—
Total softwoods	1,514.4	6.3	42.7	330.7	266.5
Select red oaks	119.9	29.2	25.7	52.5	12.5
Yellow birch	336.3	84.2	80.0	156.1	16.0
Paper birch	132.3	14.5	38.0	73.1	6.7
Sugar maple	537.7	114.2	151.6	219.4	52.5
Soft maples	116.9	19.5	27.1	54.7	15.6
Beech	306.5	19.5	63.2	185.9	37.9
White ash	57.2	13.8	13.9	20.5	9.0
Aspen	117.5	4.0	19.3	58.2	36.0
Basswood	34.8	5.8	10.5	16.3	2.2
Other hardwoods	68.6	8.9	17.3	27.8	14.6
Total hardwoods	1,827.7	313.6	446.6	864.5	203.0

[1] International ¼-inch rule.
[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.
[3] Species other than pines were not graded into standard-lumber log grades.

Table 72.—*Volume of sawtimber in the NORTHEASTERN REGION, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	1,064.4	15.1	79.1	494.1	476.1
Red pine[3]	189.7	1.7	3.9	128.3	55.8
Other softwoods[4]	2,260.8	—	—	—	—
Total softwoods	3,514.9	16.8	83.0	622.4	531.9
Select white oaks	64.3	8.3	12.0	32.9	11.1
Select red oaks	250.2	53.1	52.5	121.9	22.7
Yellow birch	814.1	161.1	210.1	397.2	45.7
Paper birch	183.7	21.3	46.9	106.0	9.5
Sugar maple	1,581.0	309.8	407.1	701.7	162.4
Soft maples	804.4	91.4	159.8	448.7	104.5
Beech	1,009.1	74.1	208.6	623.4	103.0
White ash	225.3	40.3	61.3	88.6	35.1
Aspen	372.5	16.8	55.9	199.7	100.1
Basswood	194.2	24.6	50.9	104.8	13.9
Black cherry	304.4	30.5	64.8	136.1	73.0
Elm	354.5	82.7	100.4	136.2	35.2
Other hardwoods	62.3	2.6	8.6	32.5	18.6
Total hardwoods	6,220.0	916.6	1,438.9	3,129.7	734.8

[1] International ¼-inch rule.
[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.
[3] Includes a small volume of yellow pine.
[4] Species other than pine were not graded into standard-lumber log grades.

Table 73.—*Volume of sawtimber in the CAPITOL DISTRICT UNIT, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	603.6	2.9	27.5	253.8	319.4
Red pine	23.8	—	.1	13.7	10.0
Yellow pine	12.4	—	—	4.8	7.6
Other softwoods[3]	352.0	—	—	—	—
Total softwoods	991.8	2.9	27.6	272.3	337.0
Select white oaks	86.1	21.5	21.3	34.6	8.7
Select red oaks	270.9	74.6	63.1	110.7	22.5
Other oaks	84.5	11.2	19.4	38.9	15.0
Hickory	44.1	5.9	5.1	20.5	12.6
Yellow birch	33.3	6.9	9.1	15.7	1.6
Sweet birch	11.4	1.7	2.0	7.1	.6
Paper birch	26.5	3.1	7.4	14.7	1.3
Sugar maple	247.3	34.9	59.9	125.7	26.8
Soft maples	98.9	10.7	23.0	51.2	14.0
Beech	55.2	3.0	10.6	34.1	7.5
White ash	75.3	15.0	23.5	27.0	9.8
Basswood	45.1	4.3	12.2	25.5	3.1
Aspen	33.0	8.9	1.6	17.0	5.5
Black cherry	15.0	—	4.0	8.1	2.9
Elm	73.1	11.1	17.3	37.9	6.8
Other hardwoods	17.3	3.1	2.6	10.1	1.5
Total hardwoods	1,217.0	215.9	282.1	578.8	140.2

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.

[3] Species other than pines were not graded into standard-lumber log grades.

Table 74.—*Volume of sawtimber in the CATSKILL-LOWER HUDSON UNIT, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	497.0	4.8	18.3	235.9	238.0
Red pine	16.5	—	.1	9.0	7.4
Yellow pine	16.5	—	.9	15.4	.2
Other softwoods[3]	451.3	—	—	—	—
Total softwoods	981.3	4.8	19.3	260.3	245.6
Select white oaks	292.0	72.4	80.1	113.4	26.1
Select red oaks	674.8	234.9	150.7	249.9	39.3
Other oaks	507.3	106.8	105.8	226.8	67.9
Hickory	128.5	24.7	20.1	55.6	28.1
Yellow birch	40.5	8.0	11.3	19.3	1.9
Sweet birch	78.6	2.9	20.9	47.4	7.4
Sugar maple	264.1	49.3	60.7	126.9	27.2
Soft maples	361.0	31.5	69.6	209.9	50.0
Beech	103.7	3.9	10.0	78.8	11.0
White ash	147.1	25.0	45.0	56.7	20.4
Basswood	68.0	12.2	23.4	28.3	4.1
Aspen	43.0	3.1	15.6	17.3	7.0
Black cherry	108.2	21.1	20.1	44.5	22.5
Yellow-poplar	74.8	40.2	13.1	17.6	3.9
Elm	29.6	7.7	8.4	11.2	2.3
Other hardwoods	19.1	3.9	7.4	6.3	1.5
Total hardwoods	2,940.3	647.6	662.2	1,309.9	320.6

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.

[3] Species other than pines were not graded into standard-lumber log grades.

Table 75.—*Volume of sawtimber in the SOUTHEASTERN REGION, by species and log-quality class, 1968*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
White pine	1,100.6	7.7	45.8	489.7	557.4
Red pine	40.3	—	.2	22.7	17.4
Yellow pines	28.9	—	.9	20.2	7.8
Other softwoods[3]	803.3	—	—	—	—
Total softwoods	1,973.1	7.7	46.9	532.6	582.6
Select white oaks	378.1	93.9	101.4	148.0	34.8
Select red oaks	945.7	309.5	213.8	360.6	61.8
Other red oaks	591.8	118.0	125.2	265.7	82.9
Hickory	172.6	30.6	25.2	76.1	40.7
Yellow birch	73.8	14.9	20.4	35.0	3.5
Sweet birch	90.0	4.6	22.9	54.5	8.0
Paper birch	27.9	3.1	7.5	15.9	1.4
Sugar maple	511.4	84.2	120.6	252.6	54.0
Soft maples	459.9	42.2	92.6	261.1	64.0
Beech	158.9	6.9	20.6	112.9	18.5
White ash	222.4	40.0	68.5	83.7	30.2
Basswood	113.1	16.5	35.6	53.8	7.2
Aspen	76.0	12.0	17.2	34.3	12.5
Black cherry	123.2	21.1	24.1	52.6	25.4
Yellow-poplar	74.8	40.2	13.1	17.6	3.9
Elm	35.0	7.0	9.9	15.2	2.9
Other hardwoods	102.7	18.8	25.7	49.1	9.1
Total hardwoods	4,157.3	863.5	944.3	1,888.7	460.8

[1] International ¼-inch rule.

[2] Grade 4 applies only to the pines. For hardwoods the volumes in this column are for construction logs.

[3] Species other than pine were not graded into standard-lumber log grades.

Table 76.—*Average annual net growth, timber removal, and mortality of growing stock and sawtimber, by species, in the Southwestern Region, 1950-67*

Species	Growing stock (In thousands of cubic feet)			Sawtimber (In thousands of board feet)[1]		
	Net growth	Removal	Mortality	Net growth	Removal	Mortality
White pine	7,249	645	1,253	25,633	2,397	3,559
Red pine	5,266	955	1,292	13,273	—	1,473
Spruce	528	136	2,001	544	—	1,255
Balsam fir	48	—	55	—	—	—
Hemlock	7,697	2,956	1,637	16,739	12,554	1,780
Other softwoods	221	—	151	427	—	67
All softwoods	21,009	4,692	6,389	56,616	14,951	8,134
Select white oaks	2,024	2,593	244	8,167	10,390	678
Select red oaks	7,595	4,516	1,239	23,856	15,754	1,377
Other oaks	1,184	492	1,148	3,212	1,426	1,477
Hickory	4,689	561	856	9,987	2,618	762
Yellow birch	400	747	2,467	1,283	2,920	1,379
Sweet birch	1,692	1,624	233	1,598	6,693	214
Paper birch	131	—	36	351	—	26
Sugar maple	19,934	18,754	2,993	43,099	82,637	3,552
Soft maples	17,425	5,029	2,648	17,502	20,713	3,483
Beech	7,856	6,380	1,866	16,320	24,406	762
Ash	13,106	2,058	1,609	31,778	4,296	1,595
Basswood	5,772	4,351	1,497	15,024	14,939	1,150
Aspen	5,730	242	1,921	5,636	—	354
Black cherry	2,624	1,403	1,561	6,749	2,980	1,998
Elm	−4,456	1,014	10,465	−15,135	3,841	18,939
Other hardwoods	1,390	605	674	4,033	1,516	1,487
All hardwoods	87,096	50,369	31,457	173,460	195,129	39,233
All species	108,105	55,061	37,846	230,076	210,080	47,367

[1] International ¼-inch rule.

Table 77.—Average annual net growth, timber removal, and mortality of growing stock and sawtimber, by species, in the Northern Region, 1950-67

Species	Growing stock (In thousands of cubic feet)			Sawtimber (In thousands of board feet)[1]		
	Net growth	Removal	Mortality	Net growth	Removal	Mortality
White pine	11,540	8,083	2,031	40,049	37,787	2,420
Red pine	1,479	290	224	3,984	1,137	496
Spruce	6,260	5,787	5,027	3,123	20,234	12,543
Balsam fir	6,476	5,292	3,421	8,630	5,606	2,895
Hemlock	3,927	5,704	2,870	12,075	22,001	5,488
Other softwoods	1,307	2,887	901	2,509	3,743	754
All softwoods	30,989	28,043	14,474	70,370	90,508	24,596
Select white oaks	134	166	43	761	—	19
Select red oaks	3,306	588	365	11,181	1,555	814
Other oaks	4	—	3	—	—	—
Hickory	413	271	109	479	1,264	36
Yellow birch	1,193	3,454	5,197	2,254	15,657	10,214
Sweet birch	86	146	279	265	682	38
Paper birch	1,314	817	1,090	1,889	3,699	827
Sugar maple	13,847	11,844	4,668	38,215	49,025	6,168
Soft maples	8,794	3,366	2,883	17,483	11,516	3,297
Beech	3,324	4,185	1,867	12,108	16,465	3,856
Ash	1,972	1,960	1,585	6,575	6,672	1,197
Basswood	1,858	1,205	704	7,625	3,943	752
Aspen	4,530	641	4,512	13,963	—	1,261
Black cherry	4,603	1,421	1,102	10,357	5,746	2,694
Elm	1,382	1,695	3,299	6,650	7,447	3,802
Other hardwoods	288	121	197	1,061	565	536
All hardwoods	47,048	31,880	27,903	130,866	124,236	35,511
All species	78,037	59,923	42,377	201,236	214,744	60,107

[1] International ¼-inch rule.

Table 78.—*Average annual net growth, timber removal, and mortality of growing stock and sawtimber, by species, in the Southeastern Region, 1950-67*

Species	Growing stock (In thousands of cubic feet)			Sawtimber (In thousands of board feet)[1]		
	Net growth	Removal	Mortality	Net growth	Removal	Mortality
White pine	7,857	3,872	3,293	31,508	16,567	5,377
Red pine	2,864	381	377	3,024	—	401
Spruce	341	577	325	92	2,179	981
Balsam fir	39	—	21	—	—	—
Hemlock	5,386	3,135	1,682	20,320	13,895	2,871
Other softwoods	1,015	—	739	2,070	—	640
All softwoods	17,502	7,965	6,437	57,014	32,641	10,270
Select white oaks	1,794	418	793	5,157	—	356
Select red oaks	8,142	2,461	2,595	30,437	2,712	2,704
Other oaks	6,336	316	2,427	19,066	—	1,521
Hickory	1,085	101	399	3,421	—	240
Yellow birch	221	173	855	432	321	1,005
Sweet birch	1,597	1,791	232	3,171	5,760	124
Paper birch	1,041	334	519	956	—	246
Sugar maple	6,533	1,074	1,228	17,597	1,093	1,340
Soft maples	7,393	1,303	1,880	15,571	3,135	1,300
Beech	645	1,135	900	1,099	798	674
Ash	3,281	581	854	6,910	796	592
Basswood	605	48	389	2,915	—	313
Aspen	1,303	—	1,296	4,534	—	189
Black cherry	1,106	657	628	3,969	529	807
Elm	– 202	342	1,770	1,137	491	1,749
Other hardwoods	976	117	1,475	1,802	—	596
All hardwoods	41,856	10,851	18,240	118,174	15,635	13,756
All species	59,358	18,816	24,677	175,188	48,276	24,026

[1] International ¼-inch rule.

Table 79.—*Area of New York, by land class, county, unit, and region, 1968*

County and unit	Total land area[1]	Nonforest land area	Forest-land area[2]			
			Noncommercial	Commercial		Sampling error
	Thousand acres				*Percent*	*Percent*
Cayuga	446.8	313.5	2.5	130.8	29	10
Erie	677.4	471.2	2.5	203.7	30	8
Genesee	320.6	227.1	1.3	92.2	29	13
Livingston	408.4	283.9	17.3	107.2	26	11
Madison	422.9	231.2	.3	191.4	45	7
Monroe	432.1	363.7	6.7	61.7	14	19
Niagara	340.7	282.6	.1	58.0	17	20
Onondaga	507.8	342.8	3.3	161.7	32	9
Ontario	416.5	297.8	1.3	117.4	28	11
Orleans	253.4	202.5	1.2	49.7	20	20
Oswego	617.2	227.3	.9	389.0	63	4
Seneca	211.2	172.4	1.0	37.8	18	22
Wayne	388.0	289.4	1.7	96.9	25	13
Wyoming	382.5	259.6	6.6	116.3	30	10
Yates	219.7	143.7	1.2	74.8	34	12
Lake Plain	6,045.2	4,108.7	47.9	1,888.6	31	2
Allegany	670.2	258.9	2.5	408.8	61	5
Cattaraugus	853.9	325.6	61.3	467.0	55	5
Chautauqua	691.6	343.4	1.8	346.4	50	6
Steuben	902.6	466.0	2.9	433.7	48	5
Southwest Highlands	3,118.3	1,393.9	68.5	1,655.9	53	2

Continued

Table 79—*Continued*

County and unit	Total land area[1]	Nonforest land area	Forest-land area[2]			
			Noncommercial	Commercial		Sampling error
	Thousand acres				*Percent*	*Percent*
Broome	456.6	214.1	1.7	240.8	53	7
Chemung	265.6	126.6	.4	138.6	53	8
Chenango	581.5	281.0	—	300.5	52	6
Cortland	321.3	162.7	.1	158.5	49	7
Delaware	933.4	317.6	62.3	553.5	59	4
Otsego	648.5	313.8	2.6	332.1	51	6
Schuyler	211.0	100.4	1.0	109.6	52	9
Tioga	335.4	160.2	—	175.2	52	7
Tompkins	308.5	162.1	1.7	144.7	46	8
South-central Highlands	4,061.8	1,838.5	69.8	2,153.5	53	2
Southwestern Region	13,225.3	7,341.1	186.2	5,698.0	43	1
Clinton	677.6	194.0	33.4	450.2	66	4
Franklin	1,071.2	181.5	234.9	654.8	61	3
Jefferson	828.1	476.5	37.2	314.4	38	8
St. Lawrence	1,771.4	529.7	156.1	1,085.6	61	3
St. Lawrence-N. Adirondack	4,348.3	1,381.7	461.6	2,505.0	38	2

Fulton	518.8	75.8	71.1	173.9	55	4
Herkimer	918.2	232.2	290.8	395.2	43	3
Lewis	826.4	204.3	60.8	561.3	68	3
Oneida	783.0	392.3	33.1	357.6	46	4
Western Adirondack	2,846.4	902.6	455.8	1,488.0	52	2
Essex	1,166.7	98.7	479.4	588.6	50	3
Hamilton	1,110.5	29.8	713.9	366.8	33	3
Warren	567.8	43.9	184.7	339.2	60	3
Eastern Adirondack	2,845.0	172.4	1,378.0	1,294.6	46	1
Northern region	10,039.7	2,456.7	2,295.4	5,287.6	53	1
Albany	336.4	203.1	2.8	130.5	39	11
Columbia	413.0	204.9	4.5	203.6	49	8
Montgomery	261.2	196.0	1.7	63.5	24	18
Rensselaer	425.8	179.7	2.3	243.8	57	6
Saratoga	523.5	189.8	18.7	315.0	60	5
Schenectady	132.4	85.5	1.2	45.7	35	18
Washington	535.0	272.5	24.4	238.1	45	7
Capitol District	2,627.3	1,331.5	55.6	1,240.2	47	3
Dutchess	520.5	255.9	13.5	251.1	48	8
Greene	418.1	126.1	71.0	221.0	53	7
Orange	532.9	279.4	15.2	238.3	45	8
Putnam	148.0	49.7	13.6	84.7	57	11
Schoharie	399.3	184.2	10.1	205.0	51	8
Suffolk	594.5	394.9	32.3	167.3	28	13
Sullivan	627.4	179.5	25.7	422.2	67	5
Ulster	730.4	194.9	152.5	383.0	52	5
Westchester	283.5	183.2	17.6	82.7	29	18

Continued

Table 79.—*Continued*

County and unit	Total land area[1]	Nonforest land area	Forest-land area[2]			
			Noncommercial	Commercial		Sampling error
	Thousand acres				*Percent*	*Percent*
Catskill-Lower Hudson	4,254.6	1,847.8	351.5	2,055.3	48	2
Southeastern Region	6,881.9	3,179.3	407.1	3,295.5	45	2
Metropolitan Region	489.3	489.3				
State total	30,636.2	13,466.4	2,888.7	14,281.1	47	1

[1] Land area from Bureau of the Census—Areas of New York: 1960 (May 1967).

[2] Forest-land area that is noncommercial includes both nonproductive and productive-reserved forest land.

Table 80.—*Area of commercial forest land in New York, by ownership class and county, 1968*

(In thousands of acres)

County	Publicly owned		Privately owned		Total
	State	Other	Farmer-owned	Other private	
Albany	7.2	3.7	30.6	89.0	130.5
Allegany	40.4	2.2	137.5	228.7	408.8
Broome	9.0	.3	81.9	149.6	240.8
Cattaraugus	32.5	3.4	146.0	285.1	467.0
Cayuga	8.7	—	69.9	52.2	130.8
Chautauqua	18.3	2.9	149.2	176.0	346.4
Chemung	.6	.5	37.3	100.2	138.6
Chenango	75.7	1.6	115.1	108.1	300.5
Clinton	23.2	3.1	173.2	250.7	450.2
Columbia	5.5	—	59.3	138.8	203.6
Cortland	27.3	—	69.9	61.3	158.5
Delaware	23.5	1.2	216.7	312.1	553.5
Dutchess	2.7	.5	53.5	194.4	251.1
Erie	.6	3.7	66.7	132.7	203.7
Essex	7.2	2.7	64.2	514.5	588.6
Franklin	20.4	1.0	98.9	534.5	654.8
Fulton	4.6	5.6	19.3	144.4	173.9
Genesee	.5	.6	37.4	53.7	92.2
Greene	2.4	.4	40.6	177.6	221.0
Hamilton	1.6	.1	1.2	363.9	366.8
Herkimer	3.9	9.5	49.5	332.3	395.2
Jefferson	15.0	15.2	121.0	163.2	314.4
Lewis	73.8	15.6	82.1	389.8	561.3
Livingston	4.4	.9	57.4	44.5	107.2
Madison	27.4	.9	71.0	92.1	191.4
Monroe	—	—	22.2	39.5	61.7
Montgomery	6.4	.5	28.1	28.5	63.5

Continued

Table 80.—*Continued*

County	Publicly owned		Privately owned		Total
	State	Other	Farmer-owned	Other private	
Niagara	—	0.2	16.1	41.7	58.0
Oneida	31.6	8.9	90.4	226.7	357.6
Onondaga	10.4	3.2	48.0	100.1	161.7
Ontario	.1	1.3	45.6	70.4	117.4
Orange	1.1	14.6	34.4	188.2	238.3
Orleans	—	5.4	22.0	22.3	49.7
Oswego	28.3	2.3	80.4	278.0	389.0
Otsego	19.5	3.8	132.5	176.3	332.1
Putnam	1.3	.2	7.9	75.3	84.7
Rensselaer	6.0	.7	46.0	191.1	243.8
St. Lawrence	59.9	4.3	266.3	755.1	1,085.6
Saratoga	3.5	14.9	46.2	250.4	315.0
Schenectady	.6	.1	6.3	38.7	45.7
Schoharie	30.8	1.1	60.9	112.2	205.0
Schuyler	10.6	6.7	31.5	60.8	109.6
Seneca	.3	6.7	21.1	9.7	37.8
Steuben	17.6	1.9	209.6	204.6	433.7
Suffolk	—	.9	6.8	159.6	167.3
Sullivan	2.0	6.6	40.4	373.2	422.2
Tioga	9.0	—	64.8	101.4	175.2
Tompkins	27.8	.5	36.2	80.2	144.7
Ulster	.1	9.4	42.7	330.8	383.0
Warren	.5	7.2	19.5	312.0	339.2
Washington	3.1	2.4	104.4	128.2	238.1
Wayne	.3	—	45.2	51.4	96.9
Westchester	2.0	—	4.0	76.7	82.7
Wyoming	1.0	.9	78.3	36.1	116.3
Yates	1.2	.3	32.5	40.8	74.8

Table 81.—*Area of commercial forest land in New York, by stand-size class and county, 1968*

(In thousands of acres)

County[1]	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	Total
Albany	37.9	21.2	60.3	11.1	130.5
Allegany	93.1	60.9	203.2	51.6	408.8
Broome	45.6	48.8	110.8	35.6	240.8
Cattaraugus	88.2	63.7	247.9	67.2	467.0
Cayuga	37.5	20.9	60.0	12.4	130.8
Chautauqua	74.5	51.0	174.8	46.1	346.4
Chemung	35.9	37.3	52.4	13.0	138.6
Chenango	57.1	61.2	136.7	45.5	300.5
Clinton	117.8	86.0	209.0	37.4	450.2
Columbia	56.2	36.4	97.5	13.5	203.6
Cortland	43.9	40.2	58.5	15.9	158.5
Delaware	178.8	138.8	187.6	48.3	553.5
Dutchess	70.4	65.6	106.8	8.3	251.1
Erie	47.3	27.6	106.8	22.0	203.7
Essex	320.3	98.5	167.4	2.4	588.6
Franklin	191.9	130.7	280.9	51.3	654.8
Fulton	53.5	26.1	67.6	26.7	173.9
Genesee	14.7	8.9	54.6	14.0	92.2
Greene	70.3	59.5	85.1	6.1	221.0
Hamilton	210.1	56.1	98.8	1.8	366.8
Herkimer	116.9	54.7	151.7	71.9	395.2
Jefferson	53.3	41.5	172.2	47.4	314.4
Lewis	168.3	79.0	232.4	81.6	561.3
Livingston	24.6	14.1	55.9	12.6	107.2
Madison	41.5	24.8	103.0	22.1	191.4
Monroe	15.5	8.7	30.9	6.6	61.7
Montgomery	20.7	11.4	23.1	8.3	63.5

Continued

Table 81.—*Continued*

County[1]	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	Total
Niagara	11.3	6.4	31.6	8.7	58.0
Oneida	75.6	34.9	155.7	91.4	357.6
Onondaga	32.7	20.1	88.9	20.0	161.7
Ontario	39.5	20.7	48.8	8.4	117.4
Orange	80.9	65.9	86.2	5.3	238.3
Orleans	8.7	5.0	28.4	7.6	49.7
Oswego	100.6	58.9	192.8	36.7	389.0
Otsego	109.8	74.6	111.4	36.3	332.1
Putnam	27.3	26.5	29.5	1.4	84.7
Rensselaer	95.1	44.0	93.8	10.9	243.8
St. Lawrence	282.9	202.7	500.3	99.7	1,085.6
Saratoga	126.4	53.8	122.5	12.3	315.0
Schenectady	11.8	5.2	24.1	4.6	45.7
Schoharie	61.1	49.1	87.0	7.8	205.0
Schuyler	28.2	26.4	43.1	11.9	109.6
Seneca	10.7	6.0	17.8	3.3	37.8
Steuben	95.5	68.4	217.3	52.5	433.7
Suffolk	19.2	25.9	109.3	12.9	167.3
Sullivan	157.0	121.6	135.9	7.7	422.2
Tioga	55.4	48.3	56.4	15.1	175.2
Tompkins	42.2	38.8	51.3	12.4	144.7
Ulster	123.7	104.6	145.5	9.2	383.0
Warren	166.0	55.5	115.6	2.1	339.2
Washington	79.9	41.6	101.7	14.9	238.1
Wayne	27.0	15.1	44.9	9.9	96.9
Westchester	20.2	19.9	39.2	3.4	82.7
Wyoming	30.6	17.4	56.9	11.4	116.3
Yates	21.2	11.7	35.4	6.5	74.8

[1] Estimates for counties in the Southwestern Region were revised and are slightly different from those in the preliminary statistical tables.

Table 82.—*Area of commercial forest land in New York, by forest type and county, 1968*

(In thousands of acres)

County[1]	White or red pine	Spruce-fir	Other soft-wood[2]	Oak-pine	Oak[3]	Elm-ash-red maple	Maple-beech-birch	Aspen-birch	Total
Albany	23.8	—	7.3	4.6	20.7	34.2	34.6	5.3	130.5
Allegany	16.1	—	23.4	—	38.3	71.0	230.6	29.4	408.8
Broome	20.2	—	20.0	—	18.1	53.1	109.4	20.0	240.8
Cattaraugus	21.3	—	29.5	—	39.5	77.1	262.1	37.5	467.0
Cayuga	3.6	—	7.5	—	9.7	52.9	51.9	5.2	130.8
Chautauqua	13.9	—	22.5	—	32.3	58.6	193.1	26.0	346.4
Chemung	12.6	—	10.1	—	11.8	29.0	65.5	9.6	138.6
Chenango	24.0	—	24.9	—	22.7	66.4	137.6	24.9	300.5
Clinton	31.6	54.8	14.8	—	6.7	105.7	171.9	64.7	450.2
Columbia	37.8	—	10.7	8.2	33.6	53.7	49.8	9.8	203.6
Cortland	15.9	—	11.3	—	12.5	33.0	75.8	10.0	158.5
Delaware	61.0	—	37.3	—	41.4	113.9	267.8	32.1	553.5
Dutchess	29.7	—	7.1	12.3	74.8	71.1	48.7	7.4	251.1
Erie	5.4	—	10.6	—	12.4	81.9	82.8	10.6	203.7
Essex	92.3	88.3	6.6	—	49.0	47.6	259.1	45.7	588.6
Franklin	39.9	73.9	24.0	—	8.4	151.0	267.9	89.7	654.8
Fulton	11.9	11.7	4.5	—	2.7	31.0	95.3	16.8	173.9
Genesee	1.8	—	4.5	—	3.8	37.8	38.9	5.4	92.2

Continued

Table 82.—*Continued*

County[1]	White or red pine	Spruce-fir	Other soft-wood[2]	Oak-pine	Oak[3]	Elm-ash-red maple	Maple-beech-birch	Aspen-birch	Total
Greene	27.3	—	7.4	11.3	63.6	56.9	47.1	7.4	221.0
Hamilton	56.1	56.7	4.9	—	23.9	29.7	165.8	29.7	366.8
Herkimer	24.6	24.1	10.1	—	6.2	64.1	226.0	40.1	395.2
Jefferson	19.4	40.3	9.5	—	4.5	69.1	109.8	61.8	314.4
Lewis	40.8	45.1	15.3	—	8.8	101.9	291.5	57.9	561.3
Livingston	2.5	—	6.1	—	6.4	43.0	43.8	5.4	107.2
Madison	5.0	—	9.4	—	11.0	77.8	77.3	10.9	191.4
Monroe	1.6	—	3.6	—	4.3	25.0	24.9	2.3	61.7
Montgomery	11.1	—	3.7	2.6	9.9	15.7	18.0	2.5	63.5
Niagara	1.2	—	2.8	—	3.0	25.3	23.6	2.1	58.0
Oneida	20.7	25.8	7.6	—	3.7	45.9	204.9	49.0	357.6
Onondaga	3.7	—	8.5	—	8.3	67.2	65.2	8.8	161.7
Ontario	4.3	—	5.8	—	11.0	45.6	46.8	3.9	117.4
Orange	26.9	—	6.0	11.0	75.4	66.6	49.2	3.2	238.3
Orleans	.9	—	2.7	—	2.5	20.5	20.6	2.5	49.7
Oswego	11.4	—	19.6	—	25.6	157.3	154.6	20.5	389.0
Otsego	36.2	—	24.4	—	21.8	64.3	162.1	23.3	332.1
Putnam	10.4	—	1.4	4.2	28.4	23.5	16.1	.7	84.7
Rensselaer	51.7	—	10.5	8.2	36.0	56.7	71.3	9.4	243.8

St. Lawrence	68.8	129.3	36.2	—	15.1	250.7	424.9	160.6	1,085.6
Saratoga	67.6	—	14.2	10.1	45.6	72.4	93.5	11.6	315.0
Schenectady	8.2	—	2.8	.9	6.7	12.6	12.7	1.8	45.7
Schoharie	24.2	—	7.7	10.0	55.8	53.9	44.3	9.1	205.0
Schuyler	10.5	—	8.2	—	8.5	23.1	51.5	7.8	109.6
Seneca	1.2	—	2.0	—	3.3	15.6	14.3	1.4	37.8
Steuben	17.9	—	28.3	—	43.7	72.3	239.1	32.4	433.7
Suffolk	18.1	—	7.7	7.7	38.1	54.1	28.4	13.2	167.3
Sullivan	50.9	—	11.4	20.8	131.0	105.8	93.8	8.5	422.2
Tioga	17.9	—	11.4	—	14.1	35.2	86.7	9.9	175.2
Tompkins	13.8	—	10.3	—	12.0	29.6	69.0	10.0	144.7
Ulster	47.9	—	14.7	19.5	106.8	96.4	86.4	11.3	383.0
Warren	57.5	49.6	3.4	—	29.5	32.5	136.5	30.2	339.2
Washington	47.1	—	11.5	8.7	36.7	59.0	64.6	10.5	238.1
Wayne	2.5	—	5.6	—	6.8	40.0	38.5	3.5	96.9
Westchester	7.6	—	1.6	2.5	25.6	27.3	17.4	.7	82.7
Wyoming	3.0	—	6.8	—	7.6	46.1	47.3	5.5	116.3
Yates	2.5	—	3.4	—	5.3	30.0	30.5	3.1	74.8

[1] Estimates for counties in the Southwestern Region were revised and are slightly different from those in the preliminary statistical tables.
[2] Includes plantations and may include spruce-fir if no acreage is shown for spruce-fir.
[3] Includes the oak-hickory type and may include oak-pine if no acreage is shown for oak-pine.

Table 83.—*Net cubic-foot volume on commercial forest land in New York, by tree-size class and county, 1968*

(In millions of cubic feet)

County	Sawtimber trees	Poletimber trees	Total growing stock
Albany	52.3	49.9	102.2
Allegany	170.8	181.7	352.5
Broome	76.7	98.4	175.1
Cattaraugus	164.2	187.6	351.8
Cayuga	57.1	56.7	113.8
Chautauqua	137.5	150.0	287.5
Chemung	59.9	72.4	132.3
Chenango	96.3	123.9	220.2
Clinton	149.6	171.4	321.0
Columbia	79.6	79.1	158.7
Cortland	70.5	80.0	150.5
Delaware	274.4	286.8	561.2
Dutchess	109.4	121.8	231.2
Erie	74.4	77.1	151.5
Essex	365.1	258.7	623.8
Franklin	235.2	263.1	498.3
Fulton	76.5	71.4	147.9
Genesee	24.6	26.5	51.1
Greene	104.7	114.9	219.6
Hamilton	229.9	155.0	384.9
Herkimer	177.5	161.6	339.1
Jefferson	73.8	88.2	162.0
Lewis	235.0	218.9	453.9
Livingston	38.6	39.8	78.4
Madison	66.4	70.2	136.6
Monroe	23.9	23.6	47.5
Montgomery	28.2	25.4	53.6

Continued

Table 83.—*Continued*

County	Sawtimber trees	Poletimber trees	Total growing stock
Niagara	18.0	18.0	36.0
Oneida	140.3	134.6	274.9
Onondaga	52.4	56.6	109.0
Ontario	59.6	55.9	115.5
Orange	119.6	125.5	245.1
Orleans	14.2	14.6	28.8
Oswego	156.1	162.1	318.2
Otsego	163.7	160.3	324.0
Putnam	42.9	47.0	89.9
Rensselaer	125.8	110.4	236.2
St. Lawrence	355.9	406.6	762.5
Saratoga	165.7	143.5	309.2
Schenectady	15.8	15.5	31.3
Schoharie	90.3	98.6	188.9
Schuyler	45.7	53.0	98.7
Seneca	16.5	16.0	32.5
Steuben	176.6	196.9	373.5
Suffolk	37.5	50.9	88.4
Sullivan	226.5	236.5	463.0
Tioga	87.9	95.9	183.8
Tompkins	67.9	77.3	145.2
Ulster	183.7	203.0	386.7
Warren	192.1	142.2	334.3
Washington	108.2	99.7	207.9
Wayne	41.0	40.7	81.7
Westchester	33.6	35.7	69.3
Wyoming	46.9	48.0	94.9
Yates	32.3	31.9	64.2

Table 84.—*Volume of growing stock on commercial forest land in New York, by stand-size class and county, 1968*

(In millions of cubic feet)

County[1]	Sawtimber stands	Poletimber stands	Other stands[2]	Total	Sampling error[3]
Albany	55.0	26.4	20.8	102.2	13
Allegany	167.6	101.9	83.0	352.5	9
Broome	66.7	66.4	42.0	175.1	13
Cattaraugus	155.0	102.2	94.6	351.8	9
Cayuga	63.2	28.8	21.8	113.8	15
Chautauqua	132.4	84.4	70.7	287.5	10
Chemung	56.6	52.8	22.9	132.3	14
Chenango	84.9	83.7	51.6	220.2	11
Clinton	146.2	97.3	77.5	321.0	8
Columbia	80.0	44.3	34.4	158.7	11
Cortland	68.9	56.9	24.7	150.5	13
Delaware	282.7	196.3	82.2	561.2	7
Dutchess	107.9	83.1	40.2	231.2	10
Erie	77.8	36.6	37.1	151.5	13
Essex	425.7	113.2	84.9	623.8	6
Franklin	241.6	151.2	105.5	498.3	6
Fulton	81.8	38.0	28.1	147.9	11
Genesee	23.8	11.5	15.8	51.1	23
Greene	109.2	78.3	32.1	219.6	10
Hamilton	275.4	63.1	46.4	384.9	6
Herkimer	190.5	85.5	63.1	339.1	8
Jefferson	65.8	46.5	49.7	162.0	13
Lewis	253.4	110.7	89.8	453.9	6
Livingston	41.2	19.2	18.0	78.4	18
Madison	67.7	32.4	36.5	136.6	14
Monroe	26.1	11.9	9.5	47.5	24
Montgomery	30.5	14.3	8.8	53.6	18

Continued

Table 84.—*Continued*

County[1]	Sawtimber stands	Poletimber stands	Other stands[2]	Total	Sampling error[3]
Niagara	18.8	8.7	8.5	36.0	25
Oneida	149.4	62.4	63.1	274.9	9
Onondaga	53.1	26.6	29.3	109.0	16
Ontario	66.9	27.9	20.7	115.5	15
Orange	123.5	85.0	36.6	245.1	10
Orleans	14.6	6.7	7.5	28.8	28
Oswego	164.3	78.2	75.7	318.2	9
Otsego	175.0	105.4	43.6	324.0	8
Putnam	42.2	33.5	14.2	89.9	16
Rensselaer	139.4	56.0	40.8	236.2	9
St. Lawrence	353.1	230.8	178.6	762.5	6
Saratoga	187.2	69.2	52.8	309.2	7
Schenectady	17.0	6.5	7.8	31.3	25
Schoharie	95.0	65.4	28.5	188.9	11
Schuyler	43.8	37.0	17.9	98.7	17
Seneca	17.9	8.0	6.6	32.5	26
Steuben	167.5	112.1	93.9	373.5	9
Suffolk	29.4	31.3	27.7	88.4	22
Sullivan	242.7	161.4	58.9	463.0	7
Tioga	89.5	69.7	24.6	183.8	11
Tompkins	66.9	55.2	23.1	145.2	14
Ulster	193.1	137.9	55.7	386.7	8
Warren	216.1	62.4	55.8	334.3	8
Washington	116.3	51.8	39.8	207.9	9
Wayne	45.4	20.9	15.4	81.7	19
Westchester	30.4	24.0	14.9	69.3	21
Wyoming	51.0	23.8	20.1	94.9	16
Yates	34.7	15.4	14.1	64.2	19

[1] Estimates for counties in the Southwestern Region were revised and are slightly different from those in the preliminary statistical tables.

[2] Volume is mostly in sapling-seedling stands (less than 2 percent of the volume is on nonstocked areas).

[3] Sampling error for total, expressed in percent.

Table 85.—*Volume of sawtimber on commercial forest land in New York, by stand-size class and county, 1968*

(In millions of board feet)[1]

County[2]	Sawtimber stands	Poletimber stands	Other stands[2]	Total	Sampling error[3]
Albany	137.5	28.0	35.6	201.1	18
Allegany	406.2	103.7	112.3	622.2	14
Broome	147.3	67.9	57.1	272.3	18
Cattaraugus	366.2	104.6	125.5	596.3	13
Cayuga	157.1	33.4	31.6	222.1	21
Chautauqua	318.8	85.7	95.6	500.1	16
Chemung	125.9	54.9	31.7	212.5	20
Chenango	189.5	84.7	67.9	342.1	16
Clinton	413.6	113.3	129.5	656.4	12
Columbia	201.7	46.7	58.2	306.6	15
Cortland	156.0	60.2	34.9	251.1	18
Delaware	662.1	205.9	115.0	983.0	9
Dutchess	291.4	94.4	67.0	452.8	15
Erie	193.8	43.0	53.4	290.2	32
Essex	1,236.9	146.3	167.9	1,551.1	8
Franklin	682.3	174.5	177.9	1,034.7	9
Fulton	237.4	47.5	58.3	343.2	14
Genesee	59.0	13.7	23.4	96.1	32
Greene	296.2	83.6	52.7	432.5	15
Hamilton	801.3	84.3	91.7	977.3	9
Herkimer	557.6	106.3	132.7	796.6	10
Jefferson	185.4	55.8	80.8	322.0	18
Lewis	731.0	140.3	180.0	1,051.3	8
Livingston	101.9	22.5	26.0	150.4	26
Madison	168.6	38.4	52.4	259.4	20
Monroe	65.5	13.8	13.7	93.0	40
Montgomery	76.5	15.5	16.3	108.3	24

Continued

Table 85.—*Continued*

County[2]	Sawtimber stands	Poletimber stands	Other stands	Total	Sampling error[3]
Niagara	46.8	10.2	13.2	70.2	34
Oneida	433.6	79.6	111.7	624.9	11
Onondaga	130.6	31.4	42.3	204.3	23
Ontario	170.5	32.4	30.2	233.1	22
Orange	330.6	99.1	64.4	494.1	15
Orleans	36.3	8.0	11.1	55.4	41
Oswego	408.6	91.5	108.3	608.4	13
Otsego	418.8	110.3	59.9	589.0	12
Putnam	115.1	39.4	23.2	177.7	23
Rensselaer	345.0	61.0	76.0	482.0	11
St. Lawrence	1,000.0	269.0	294.7	1,563.7	8
Saratoga	461.5	75.1	98.1	634.7	10
Schenectady	41.6	6.5	12.7	60.8	33
Schoharie	256.6	68.6	48.2	373.4	16
Schuyler	99.6	38.4	24.7	162.7	23
Seneca	45.9	9.5	9.2	64.6	39
Steuben	400.0	113.7	127.7	641.4	13
Suffolk	80.5	31.0	46.1	157.6	31
Sullivan	653.1	180.2	100.6	933.9	10
Tioga	204.0	74.9	34.4	313.3	16
Tompkins	154.4	56.2	31.3	241.9	20
Ulster	525.0	143.0	91.3	759.3	11
Warren	623.3	80.1	110.3	813.7	11
Washington	289.2	55.0	71.1	415.3	12
Wayne	112.5	24.1	22.7	159.3	28
Westchester	82.3	30.8	27.2	140.3	30
Wyoming	126.1	27.6	28.8	182.5	24
Yates	87.4	17.9	20.9	126.2	27

[1] International ¼-inch rule.
[2] Estimates for counties in the Southwestern Region were revised and are slightly different from those in the preliminary statistical table.
[3] Sampling error for total, expressed in percent.

Table 86.—*Volume of growing stock on commercial forest land in New York, by forest type and county, 1968*

(In millions of cubic feet)

County[1]	White or red pine	Spruce-fir	Other soft-wood[2]	Oak-pine	Oak[3]	Elm-ash-red maple	Maple-beech-birch	Aspen-birch	Total
Albany	27.1	—	7.7	4.8	15.7	19.2	25.3	2.4	102.2
Allegany	19.6	—	17.1	—	55.2	67.2	186.2	7.2	352.5
Broome	20.7	—	18.2	—	22.8	41.9	66.0	5.5	175.1
Cattaraugus	25.5	—	18.7	—	54.7	58.3	186.2	8.4	351.8
Cayuga	5.1	—	8.7	—	13.4	39.8	45.2	1.6	113.8
Chautauqua	17.5	—	15.0	—	45.8	52.2	150.2	6.8	287.5
Chemung	15.6	—	10.5	—	16.8	28.6	57.3	3.5	132.3
Chenango	25.5	—	22.8	—	28.6	52.1	84.0	7.2	220.2
Clinton	33.3	44.2	16.3	—	5.6	70.8	128.7	22.1	321.0
Columbia	42.9	—	11.2	8.5	25.4	30.1	36.1	4.5	158.7
Cortland	19.8	—	11.7	—	17.3	31.8	66.7	3.2	150.5
Delaware	83.6	—	41.5	—	57.6	114.0	253.7	10.8	561.2
Dutchess	35.5	—	8.8	11.9	82.5	51.7	40.6	.2	231.2
Erie	6.9	—	9.1	—	15.5	56.0	61.1	2.9	151.5
Essex	111.3	104.4	10.3	—	43.1	39.3	263.7	51.7	623.8
Franklin	40.6	59.6	28.9	—	6.8	107.9	222.1	32.4	498.3
Fulton	17.5	13.1	7.5	—	3.8	33.2	66.2	6.6	147.9
Genesee	2.1	—	2.8	—	4.4	19.6	20.8	1.4	51.1
Greene	35.3	—	10.0	11.8	75.3	44.6	42.4	0.2	219.6
Hamilton	67.0	65.1	7.6	—	21.9	21.7	166.4	35.2	384.9
Herkimer	39.1	28.8	17.6	—	9.1	73.4	155.9	15.2	339.1
Jefferson	17.8	27.1	8.9	—	3.0	34.6	56.8	13.8	162.0
Lewis	54.8	51.0	20.0	—	9.7	99.5	195.5	23.4	453.9
Livingston	3.4	—	5.7	—	8.4	28.0	31.4	1.5	78.4
Madison	6.2	—	7.3	—	13.1	51.8	55.3	2.9	136.6

Monroe	2.4	—	3.4	—	5.9	16.8	18.3	.7	47.5
Montgomery	13.7	—	4.2	2.9	8.1	9.5	13.9	1.3	53.6
Niagara	1.7	—	2.4	—	4.0	13.4	13.9	.6	36.0
Oneida	33.6	37.8	10.6	—	4.4	55.6	112.7	20.2	274.9
Onondaga	4.1	—	6.7	—	9.6	41.5	44.9	2.2	109.0
Ontario	7.4	—	6.8	—	15.8	39.9	44.0	1.6	115.5
Orange	36.1	—	8.4	11.9	88.7	54.1	45.8	.1	245.1
Orleans	1.3	—	2.0	—	3.3	10.4	11.1	.7	28.8
Oswego	13.8	—	19.1	—	31.7	118.2	129.9	5.5	318.2
Otsego	52.4	—	23.6	—	29.5	63.7	149.0	5.8	324.0
Putnam	14.3	—	2.0	4.8	33.6	19.7	15.5	—	89.9
Rensselaer	73.0	—	13.7	10.5	33.8	39.5	60.3	5.4	236.2
St. Lawrence	71.6	101.3	40.5	—	11.9	167.9	317.8	51.5	762.5
Saratoga	96.7	—	18.6	13.2	43.4	51.1	79.3	6.9	309.2
Schenectady	8.2	—	2.6	.8	4.5	6.2	8.3	.7	31.3
Schoharie	29.0	—	9.6	9.7	64.3	39.2	36.9	.2	188.9
Schuyler	12.9	—	8.2	—	11.7	21.5	41.9	2.5	98.7
Seneca	2.1	—	1.8	—	4.5	11.8	11.8	.5	32.5
Steuben	24.2	—	20.6	—	61.5	64.9	192.6	9.7	373.5
Suffolk	12.5	—	5.5	4.3	29.8	22.5	13.6	.2	88.4
Sullivan	72.7	—	16.9	24.2	164.1	91.7	93.2	.2	463.0
Tioga	24.7	—	12.7	—	20.0	36.5	86.7	3.2	183.8
Tompkins	18.8	—	11.1	—	17.3	30.3	63.7	4.0	145.2
Ulster	63.1	—	19.9	20.8	126.7	77.0	78.9	.3	386.7
Warren	64.2	51.9	5.3	—	23.9	24.0	135.1	29.9	334.3
Washington	59.9	—	13.5	10.1	31.0	37.0	50.9	5.5	207.9
Wayne	3.5	—	6.6	—	9.4	28.6	32.5	1.1	81.7
Westchester	8.3	—	1.8	2.2	25.8	18.0	13.2	—	69.3
Wyoming	3.9	—	7.1	—	10.1	33.6	38.6	1.6	94.9
Yates	3.5	—	3.3	—	6.9	23.7	25.8	1.0	64.2

[1] Estimates for counties in the Southwestern Region were revised and are slightly different from those in the preliminary statistical tables.
[2] Includes plantations and may include spruce-fir if no volume is shown for spruce-fir.
[3] Includes the oak-hickory type and may include oak-pine if no volume is shown for oak-pine.

Table 87.—*Volume of sawtimber on commercial forest land in New York, by forest type and county, 1968*

(In millions of board feet)[1]

County[2]	White or red pine	Spruce-fir	Other soft-wood[3]	Oak-pine	Oak[4]	Elm-ash-red maple	Maple-beech-birch	Aspen-birch	Total
Albany	69.3	—	10.6	10.6	33.8	28.9	46.2	1.7	201.1
Allegany	35.2	—	9.4	—	101.1	126.0	340.4	10.1	622.2
Broome	40.6	—	25.0	—	34.5	53.6	113.6	5.0	272.3
Cattaraugus	44.4	—	11.0	—	107.7	84.7	337.1	11.4	596.3
Cayuga	13.1	—	10.2	—	28.6	75.3	93.1	1.8	222.1
Chautauqua	31.3	—	8.3	—	86.3	90.9	273.2	10.1	500.1
Chemung	29.8	—	16.7	—	24.0	37.9	100.7	3.4	212.5
Chenango	51.4	—	31.8	—	42.7	65.8	143.8	6.6	342.1
Clinton	97.5	68.5	20.3	—	12.6	133.8	297.7	26.0	656.4
Columbia	107.2	—	15.0	18.4	53.6	44.3	65.0	3.1	306.6
Cortland	40.6	—	19.3	—	24.8	42.5	121.0	2.9	251.1
Delaware	191.1	—	74.2	—	82.4	151.1	473.9	10.3	983.0
Dutchess	91.2	—	7.7	21.7	169.4	85.9	76.9	—	452.8
Erie	16.7	—	10.8	—	31.9	102.5	124.8	3.5	290.2
Essex	303.1	243.7	41.2	—	84.6	55.0	704.4	119.1	1,551.1
Franklin	117.2	92.4	34.9	—	16.1	207.8	526.1	40.2	1,034.7
Fulton	39.5	24.8	9.3	—	6.1	71.9	179.1	12.5	343.2
Genesee	4.9	—	3.3	—	8.7	35.6	41.9	1.7	96.1
Greene	91.4	—	8.7	21.8	154.6	74.9	81.1	—	432.5
Hamilton	182.3	152.4	30.5	—	46.6	30.9	449.2	85.4	977.3
Herkimer	90.5	56.0	22.1	—	14.5	159.0	425.2	29.3	796.6
Jefferson	50.1	40.4	8.9	—	7.5	65.5	130.5	19.1	322.0
Lewis	123.2	102.3	24.8	—	15.8	215.4	523.6	46.2	1,051.3
Livingston	8.3	—	6.6	—	17.7	52.2	63.9	1.7	150.4
Madison	14.7	—	8.7	—	26.3	93.9	112.2	3.6	259.4
Monroe	6.2	—	4.0	—	12.5	31.8	37.7	.8	93.0

Montgomery	35.7	—	5.9	6.6	17.9	14.7	26.6	.9	**108.3**
Niagara	4.2	—	2.8	—	8.4	25.5	28.6	.7	70.2
Oneida	78.4	73.3	13.1	—	7.7	118.3	296.7	37.4	624.9
Onondaga	9.1	—	7.7	—	19.3	75.8	89.5	2.9	204.3
Ontario	19.5	—	8.8	—	33.7	75.7	93.8	1.6	233.1
Orange	93.4	—	7.3	21.9	192.5	91.1	87.9	—	494.1
Orleans	3.4	—	2.4	—	6.9	19.6	22.3	.8	55.4
Oswego	33.3	—	22.4	—	64.8	216.1	264.8	7.0	608.4
Otsego	127.8	—	44.6	—	42.0	82.9	285.7	6.0	589.0
Putnam	36.4	—	1.7	8.5	69.9	32.3	28.9	—	177.7
Rensselaer	175.5	—	19.4	24.2	75.4	61.4	122.1	4.0	482.0
St. Lawrence	210.8	155.7	49.6	—	26.4	318.6	739.2	63.4	1,563.7
Saratoga	232.4	—	26.7	30.2	97.2	79.8	163.4	5.0	634.7
Schenectady	21.8	—	3.5	1.8	9.4	9.2	14.6	.5	60.8
Schoharie	76.2	—	8.5	18.1	132.1	66.8	71.7	—	373.4
Schuyler	27.0	—	13.1	—	17.1	28.2	74.9	2.4	162.7
Seneca	5.2	—	2.2	—	9.4	22.2	25.1	.5	64.6
Steuben	44.0	—	12.1	—	118.0	104.8	348.1	14.4	641.4
Suffolk	30.6	—	4.6	7.5	54.3	36.0	24.6	—	157.6
Sullivan	189.9	—	15.0	44.6	349.1	155.4	179.9	—	933.9
Tioga	50.9	—	22.7	—	28.0	49.5	159.1	3.1	313.3
Tompkins	40.5	—	18.9	—	24.4	39.9	114.3	3.9	241.9
Ulster	161.8	—	17.4	37.8	264.2	128.1	150.0	—	759.3
Warren	171.6	116.9	21.0	—	46.2	32.7	356.6	68.7	813.7
Washington	148.2	—	18.8	22.7	67.7	56.4	97.6	3.9	415.3
Wayne	8.7	—	7.6	—	20.3	54.5	66.9	1.3	159.3
Westchester	21.5	—	1.6	4.1	57.5	30.3	25.3	—	140.3
Wyoming	9.5	—	8.3	—	21.6	62.4	78.8	1.9	182.5
Yates	8.6	—	4.1	—	14.3	43.7	54.3	1.2	126.2

[1] International ¼-inch rule.
[2] Estimates for counties in the Southwestern Region were revised and are slightly different from those in the preliminary statistical tables.
[3] Includes plantations and may include spruce-fir if no volume is shown for spruce-fir.
[4] Includes the oak-hickory type and may include oak-pine if no volume is shown for oak-pine.

Table 88.—*Volume of growing stock on commercial forest land in New York, by species and county, 1968*

(In millions of cubic feet)

County	White pine	Red pine	Spruce	Fir	Hemlock	Other softwoods	Total softwoods	Select white oaks	Select red oaks	Other oaks	Hickory	Yellow birch
Albany	20.0	3.1	0.9	—	12.0	1.1	37.1	2.8	10.0	3.3	2.7	1.3
Allegany	6.6	12.3	—	—	31.5	2.3	52.7	12.7	35.1	3.7	6.9	3.4
Broome	10.7	8.1	—	—	18.1	2.8	39.7	1.9	12.8	3.5	2.6	2.4
Cattaraugus	7.4	12.6	—	—	29.7	2.7	52.4	13.1	35.3	4.2	8.5	4.2
Cayuga	5.4	3.6	—	—	5.4	1.5	15.9	1.8	4.6	.5	6.7	1.9
Chautauqua	5.7	10.5	—	—	24.8	1.9	42.9	10.7	29.2	3.2	6.0	3.0
Chemung	6.8	4.3	—	—	13.5	1.2	25.8	1.3	10.2	2.6	2.0	1.8
Chenango	13.5	10.3	—	—	22.2	3.4	49.4	2.3	16.1	4.2	3.3	2.9
Clinton	16.2	10.5	25.4	13.6	19.3	12.7	97.7	—	6.5	—	—	15.4
Columbia	31.2	4.7	1.2	—	17.6	1.3	56.0	4.9	16.6	5.5	4.0	1.6
Cortland	7.9	4.6	—	—	15.8	1.5	29.8	1.4	10.9	3.1	2.0	2.0
Delaware	34.3	15.1	—	—	60.3	4.3	114.0	4.8	38.5	10.7	7.1	6.9
Dutchess	20.1	2.5	1.3	—	19.9	3.0	46.8	14.8	31.4	32.4	9.1	3.5
Erie	6.0	3.2	—	—	7.8	2.3	19.3	3.2	7.4	.4	8.5	2.7
Essex	85.8	4.9	79.2	35.8	57.4	6.9	270.0	—	31.2	—	—	49.5
Franklin	21.8	16.9	36.1	19.6	26.6	18.6	139.6	—	8.4	—	—	25.2
Fulton	11.3	4.4	13.6	3.1	18.0	2.8	53.2	—	3.3	—	—	10.8
Genesee	1.8	.9	—	—	2.6	.9	6.2	1.5	3.3	.1	2.7	.9

Continued

Table 88.—*Continued*

County	Sweet birch	Sugar maple	Soft maple	Beech	Ash	Bass-wood	Aspen	Black cherry	Elm	Other hard-woods	Total hard-woods	Total all species
Albany	1.2	11.9	8.2	2.8	4.8	1.9	3.6	1.5	4.9	4.2	65.1	102.2
Allegany	3.7	87.9	47.6	29.8	20.2	12.8	11.6	11.6	9.7	3.1	299.8	352.5
Broome	3.3	32.1	35.1	8.7	10.7	6.1	7.1	3.5	4.1	1.5	135.4	175.1
Cattaraugus	4.7	76.8	45.3	31.6	21.1	14.2	13.8	12.5	10.5	3.6	299.4	351.8
Cayuga	.4	22.2	16.0	5.4	10.1	9.6	2.4	4.2	9.0	3.1	97.9	113.8
Chautauqua	3.2	68.1	38.0	24.8	16.8	11.0	10.2	9.7	7.9	2.8	244.6	287.5
Chemung	2.5	27.5	25.6	8.5	7.9	5.7	4.9	2.3	2.2	1.5	106.5	132.3
Chenango	4.0	40.8	44.4	11.4	13.3	7.8	9.0	4.3	5.0	2.0	170.8	220.2
Clinton	—	58.7	47.4	24.4	8.8	8.6	19.5	9.5	14.3	10.2	223.3	321.0
Columbia	1.9	17.5	12.2	4.0	7.8	3.0	6.4	2.4	8.1	6.8	102.7	158.7
Cortland	2.9	31.9	28.0	10.7	9.1	6.5	4.9	2.9	2.7	1.7	120.7	150.5
Delaware	10.1	122.2	100.2	44.3	32.8	24.2	17.6	11.1	10.7	6.0	447.2	561.2
Dutchess	7.3	16.5	32.9	5.9	11.9	3.4	3.1	5.4	2.0	4.8	184.4	231.2
Erie	.7	28.2	22.2	6.9	13.5	12.1	4.1	5.9	14.2	2.2	132.2	151.5
Essex	—	89.7	35.2	55.3	13.5	6.9	23.7	3.6	3.0	42.2	353.8	623.8
Franklin	—	100.4	74.8	41.7	14.4	14.6	28.7	13.9	22.2	14.4	358.7	498.3
Fulton	—	21.8	19.7	12.7	5.2	2.0	4.9	6.6	5.0	2.7	94.7	147.9
Genesee	.2	9.0	7.6	2.2	4.8	4.0	1.7	2.0	3.4	1.5	44.9	51.1

Continued

Table 88.—*Continued*

County	White pine	Red pine	Spruce	Fir	Hemlock	Other softwoods	Total softwoods	Select white oaks	Select red oaks	Other oaks	Hickory	Yellow birch
Greene	18.8	5.6	1.3	—	19.3	2.7	47.7	12.4	29.2	27.8	8.0	4.0
Hamilton	48.9	2.8	50.7	20.6	37.5	4.4	164.9	—	17.4	—	—	33.0
Herkimer	26.1	9.9	31.0	6.6	41.0	5.9	120.5	—	7.8	—	—	25.1
Jefferson	10.2	6.5	14.9	6.7	9.6	9.2	57.1	—	5.4	—	—	6.9
Lewis	35.3	12.3	45.4	11.1	55.5	10.0	169.6	—	9.2	—	—	33.7
Livingston	3.4	2.3	—	—	3.8	1.1	10.6	1.9	4.5	.3	4.5	1.3
Madison	5.0	2.4	—	—	7.1	2.3	16.8	2.3	5.3	.4	7.5	2.5
Monroe	2.4	1.3	—	—	2.3	.6	6.6	.8	2.2	.8	2.9	.8
Montgomery	10.6	1.8	.6	—	6.6	.4	20.0	1.5	5.4	1.8	1.4	.7
Niagara	1.5	.9	—	—	1.8	.5	4.7	.7	1.5	.1	2.0	.6
Oneida	22.1	5.6	29.6	7.8	33.8	9.1	108.0	—	5.1	—	—	20.0
Onondaga	3.9	2.6	—	—	5.3	1.8	13.6	1.7	3.4	.4	5.0	2.1
Ontario	5.6	2.0	—	—	6.3	1.6	15.5	1.8	6.5	.5	7.0	1.7
Orange	18.8	3.5	1.2	—	22.5	2.8	48.8	15.9	32.1	34.1	9.5	4.3
Orleans	1.4	.8	—	—	1.4	.3	3.9	.6	1.2	.1	1.7	.4
Oswego	12.2	7.1	—	—	16.1	5.0	40.4	2.5	5.9	1.0	17.6	5.8
Otsego	21.5	8.2	—	—	35.1	2.3	67.1	2.5	20.8	5.8	3.7	3.8
Putnam	7.3	.6	.3	—	8.0	1.1	17.3	6.0	12.5	12.7	3.6	1.3
Rensselaer	45.4	7.6	2.2	—	30.9	2.4	88.5	5.3	21.0	7.7	6.3	3.8

Continued

Table 88.—*Continued*

County	Sweet birch	Sugar maple	Soft maple	Beech	Ash	Bass-wood	Aspen	Black cherry	Elm	Other hard-woods	Total hard-woods	Total all species
Greene	6.1	18.1	30.7	6.8	11.0	3.6	2.9	5.5	1.7	4.1	171.9	219.6
Hamilton	—	56.6	21.8	35.6	8.2	4.0	14.6	2.3	1.9	24.6	220.0	384.9
Herkimer	—	51.6	43.9	30.3	11.6	4.3	10.8	14.7	11.3	7.2	218.6	339.1
Jefferson	—	25.5	23.1	10.4	4.7	3.8	9.6	4.3	8.4	2.8	104.9	162.0
Lewis	—	63.9	58.9	37.8	15.7	6.1	16.3	19.8	14.2	8.7	284.3	453.9
Livingston	.3	14.8	11.0	3.6	7.1	6.4	2.0	3.1	4.8	2.2	67.8	78.4
Madison	.6	24.7	20.4	6.1	12.2	10.9	3.9	5.5	13.6	3.9	119.8	136.6
Monroe	.2	9.1	6.6	2.2	4.3	3.8	1.0	1.8	3.8	1.2	40.9	47.5
Montgomery	.7	6.4	4.2	1.5	2.4	1.0	1.7	.8	1.7	2.4	33.6	53.6
Niagara	.2	6.7	5.1	1.6	3.3	3.1	1.0	1.4	3.1	.9	31.3	36.0
Oneida	—	36.3	33.6	22.3	8.7	3.5	10.4	11.2	7.4	8.4	166.9	274.9
Onondaga	.4	19.6	16.4	4.8	10.0	9.0	3.1	4.5	10.9	3.2	95.4	109.0
Ontario	.6	23.1	15.9	5.7	9.6	9.2	2.5	3.9	8.7	3.3	100.0	115.5
Orange	8.4	18.1	34.3	7.5	12.5	3.7	3.4	5.9	1.9	4.7	196.3	245.1
Orleans	.1	5.2	4.0	1.3	2.7	2.2	.9	1.2	2.6	.7	24.9	28.8
Oswego	1.4	59.6	47.3	14.6	28.1	26.2	8.2	12.3	36.0	11.3	277.8	318.2
Otsego	5.6	72.1	55.9	28.0	18.5	13.9	9.5	6.7	6.8	3.3	256.9	324.0
Putnam	2.8	6.0	13.8	2.2	4.5	1.3	1.2	2.1	.9	1.7	72.6	89.9
Rensselaer	2.8	31.0	19.9	7.4	10.8	4.7	7.1	3.3	8.1	8.5	147.7	236.2

Continued

Table 88.—*Continued*

County	White pine	Red pine	Spruce	Fir	Hemlock	Other softwoods	Total softwoods	Select white oaks	Select red oaks	Other oaks	Hickory	Yellow birch
St. Lawrence	35.8	25.2	58.6	31.1	43.7	30.9	225.3	—	5.9	—	—	37.0
Saratoga	60.7	10.3	3.2	—	40.7	3.3	118.2	6.5	26.8	9.5	8.2	5.3
Schenectady	6.3	.9	.2	—	3.7	.4	11.5	.6	2.6	.9	.8	.4
Schoharie	15.7	5.8	1.3	—	16.3	2.3	41.4	10.5	24.4	23.8	6.9	3.6
Schuyler	5.7	3.3	—	—	10.3	1.1	20.4	1.0	7.2	1.9	1.4	1.3
Seneca	1.5	.5	—	—	1.8	.5	4.3	.6	1.8	.1	2.1	.5
Steuben	7.9	14.2	—	—	31.0	2.7	55.8	14.3	39.1	4.6	8.3	4.0
Suffolk	10.1	1.1	.8	—	5.1	1.6	18.7	5.2	11.9	13.2	4.0	1.0
Sullivan	35.2	11.4	2.5	—	43.0	5.1	97.2	27.7	60.4	59.7	16.9	8.8
Tioga	8.8	4.7	—	—	19.2	1.3	34.0	1.6	13.4	3.9	2.4	2.3
Tompkins	8.5	4.3	—	—	14.9	1.1	28.8	1.3	10.9	2.5	2.2	1.8
Ulster	34.2	11.9	2.5	—	33.4	4.5	86.5	21.1	50.2	48.3	13.4	7.0
Warren	51.3	3.7	40.4	19.4	29.8	3.5	148.1	—	17.2	—	—	24.5
Washington	41.2	6.6	1.9	—	25.3	2.0	77.0	5.4	19.8	6.7	5.3	2.9
Wayne	3.8	2.9	—	—	3.8	1.0	11.5	1.3	3.1	.4	4.8	1.4
Westchester	4.3	.3	.2	—	5.6	.6	11.0	5.6	8.5	11.6	2.9	.9
Wyoming	4.2	3.0	—	—	4.5	1.3	13.0	1.5	3.4	.4	5.4	1.6
Yates	2.5	.9	—	—	3.5	1.0	7.9	1.6	4.4	.1	3.5	1.1

Continued

Table 88.—*Continued*

County	Sweet birch	Sugar maple	Soft maple	Beech	Ash	Bass-wood	Aspen	Black cherry	Elm	Other hard-woods	Total hard-woods	Total all species
St. Lawrence	—	144.4	113.6	60.1	21.8	20.7	45.0	22.4	34.3	32.0	537.2	762.5
Saratoga	3.7	40.4	26.3	10.0	13.4	5.7	8.9	4.5	10.6	11.2	191.0	309.2
Schenectady	.4	3.8	2.6	1.0	1.4	.6	1.1	.5	1.9	1.2	19.8	31.3
Schoharie	5.6	16.3	25.0	6.3	9.8	3.2	2.5	4.9	1.2	3.5	147.5	188.9
Schuyler	1.8	20.1	18.9	6.5	5.9	4.0	3.5	1.9	1.9	1.0	78.3	98.7
Seneca	.2	6.1	4.5	1.5	2.7	2.5	.8	1.3	2.7	.8	28.2	32.5
Steuben	4.4	83.8	48.3	32.7	22.0	14.7	14.5	12.6	10.4	4.0	317.7	373.5
Suffolk	2.6	6.5	10.6	1.2	5.3	1.0	1.6	2.1	.8	2.7	69.7	88.4
Sullivan	14.5	37.6	64.6	15.8	23.1	7.8	5.9	11.7	3.3	8.0	365.8	463.0
Tioga	3.6	41.1	33.4	14.9	10.9	8.6	5.4	3.4	2.8	2.1	149.8	183.8
Tompkins	2.5	30.8	27.5	10.2	8.5	6.2	5.4	2.5	2.5	1.6	116.4	145.2
Ulster	10.6	33.0	52.8	12.4	20.1	6.5	4.9	9.6	2.8	7.5	300.2	386.7
Warren	—	45.8	18.9	27.7	7.1	4.1	13.9	2.0	2.2	22.8	186.2	334.3
Washington	2.5	25.1	16.8	6.1	9.6	3.8	7.2	3.1	8.3	8.3	130.9	207.9
Wayne	.3	16.0	11.5	3.9	7.3	7.1	1.7	3.0	6.4	2.0	70.2	81.7
Westchester	3.6	4.0	9.0	1.7	4.7	.8	1.1	1.6	.6	1.7	58.3	69.3
Wyoming	.4	18.3	13.6	4.5	8.5	7.9	2.2	3.6	8.1	2.5	81.9	94.9
Yates	.3	12.5	9.5	3.1	5.6	5.3	1.6	2.2	3.6	1.9	56.3	64.2

Table 89.—*Volume of sawtimber on commercial forest land in New York, by species and county, 1968*

(In millions of board feet)[1]

County	White pine	Red pine	Spruce	Fir	Hemlock	Other softwoods	Total softwoods	Select white oaks	Select red oaks	Other oaks	Hickory	Yellow birch
Albany	55.4	2.0	1.8	—	27.9	2.5	89.6	8.9	25.8	8.0	3.8	2.7
Allegany	15.7	5.9	—	—	60.4	.5	82.5	28.0	82.1	4.9	11.0	4.0
Broome	19.3	11.9	—	—	36.8	3.3	71.3	4.2	26.2	8.1	4.2	2.1
Cattaraugus	17.5	6.9	—	—	62.3	.8	87.5	29.1	84.1	6.0	13.9	4.7
Cayuga	9.1	5.9	—	—	11.3	1.2	27.5	5.8	15.3	2.1	9.9	1.8
Chautauqua	13.5	5.3	—	—	49.1	.5	68.4	23.7	68.6	4.3	9.7	3.5
Chemung	12.7	6.9	—	—	28.4	1.6	49.6	3.2	21.0	5.0	3.0	1.8
Chenango	25.2	15.5	—	—	46.1	3.8	90.6	5.2	32.7	9.3	5.1	2.6
Clinton	41.0	19.5	40.2	16.9	59.8	19.6	197.0	—	17.3	—	—	40.4
Columbia	86.2	2.8	2.8	—	40.8	3.2	135.8	15.6	42.0	13.2	5.4	3.3
Cortland	16.5	7.1	—	—	34.1	1.7	59.4	3.3	23.4	6.3	3.2	2.1
Delaware	81.5	23.6	—	—	137.7	5.4	248.2	11.2	84.8	20.5	11.3	7.6
Dutchess	60.1	1.6	1.7	—	46.4	4.6	114.4	36.4	78.0	62.8	15.3	3.4
Erie	12.2	4.6	—	—	15.7	1.7	34.2	9.0	24.1	1.7	11.7	2.7
Essex	283.3	16.6	176.3	46.3	162.9	14.1	699.5	—	56.2	—	—	153.7
Franklin	53.0	27.8	58.8	23.8	81.5	29.6	274.5	—	20.7	—	—	70.0
Fulton	28.3	5.6	29.5	3.1	43.4	2.1	112.0	—	8.2	—	—	29.7
Genesee	4.2	1.0	—	—	5.1	.6	10.9	4.3	10.5	.4	3.7	.9

Continued

Table 89.—*Continued*

County	Sweet birch	Sugar maple	Soft maple	Beech	Ash	Bass-wood	Aspen	Black cherry	Elm	Other hard-woods	Total hard-woods	Total all species
Albany	1.1	21.4	8.0	4.7	6.8	4.2	3.0	1.2	7.9	4.0	111.5	201.1
Allegany	2.0	163.2	81.3	51.7	29.3	27.7	6.1	20.9	20.9	6.6	539.7	622.2
Broome	2.2	50.7	37.3	14.1	16.1	14.8	4.4	5.7	8.0	2.9	201.0	272.3
Cattaraugus	2.4	139.7	60.7	53.1	28.6	29.1	6.9	19.6	23.6	7.3	508.8	596.3
Cayuga	.3	41.1	27.8	11.2	17.0	22.8	2.1	9.3	21.2	6.9	194.6	222.1
Chautauqua	1.8	124.9	60.0	42.7	23.8	23.2	5.3	16.8	17.6	5.8	431.7	500.1
Chemung	1.5	42.3	27.6	15.6	13.6	13.7	3.3	3.9	4.6	2.8	162.9	212.5
Chenango	2.6	64.3	45.5	18.9	20.4	18.6	5.7	6.9	9.9	3.8	251.5	342.1
Clinton	—	113.4	71.1	68.2	13.7	22.0	32.1	27.7	39.6	13.9	459.4	656.4
Columbia	1.8	30.8	10.1	6.4	10.4	7.0	4.6	1.5	12.8	5.9	170.8	306.6
Cortland	1.6	51.0	32.4	20.5	15.3	15.6	3.0	5.3	5.8	2.9	191.7	251.1
Delaware	5.4	204.2	119.8	87.6	57.0	57.1	10.2	20.6	26.0	11.5	734.8	983.0
Dutchess	9.2	26.7	42.3	10.0	16.0	7.0	4.4	12.0	4.0	10.9	338.4	452.8
Erie	.6	53.7	38.4	14.9	21.2	27.6	3.4	12.1	32.2	2.7	256.0	290.2
Essex	—	252.4	54.8	143.0	27.4	15.3	53.4	9.4	5.9	80.1	851.6	1,551.1
Franklin	—	205.9	114.7	117.6	24.1	34.7	51.5	40.0	61.0	20.0	760.2	1,034.7
Fulton	—	49.4	37.7	40.3	11.7	5.2	9.2	17.6	16.4	5.8	231.2	343.2
Genesee	.2	17.5	12.7	4.9	7.4	9.3	1.2	4.1	4.9	3.2	85.2	96.1

Continued

Table 89.—*Continued*

County	White pine	Red pine	Spruce	Fir	Hemlock	Other softwoods	Total softwoods	Select white oaks	Select red oaks	Other oaks	Hickory	Yellow birch
Greene	56.8	2.1	1.8	—	46.8	4.2	111.7	29.9	75.4	52.3	14.1	4.9
Hamilton	162.1	9.2	114.3	29.6	109.8	10.0	435.0	—	34.5	—	—	105.6
Herkimer	65.2	12.9	68.2	6.5	99.9	4.6	257.3	—	19.4	—	—	69.4
Jefferson	25.0	9.5	23.0	8.3	28.0	14.4	108.2	—	13.4	—	—	18.6
Lewis	92.3	16.8	102.2	10.8	135.5	8.6	366.2	—	23.5	—	—	95.4
Livingston	6.3	3.5	—	—	7.6	.8	18.2	5.7	14.5	1.2	6.7	1.3
Madison	10.9	3.0	—	—	14.2	1.7	29.8	6.5	17.0	1.3	10.1	2.5
Monroe	4.3	2.1	—	—	4.9	.4	11.7	2.5	7.3	.7	3.9	.7
Montgomery	30.1	1.2	1.1	—	15.4	1.2	49.0	5.0	14.2	4.2	2.1	1.5
Niagara	3.0	1.4	—	—	3.6	.3	8.3	2.1	4.9	.5	2.8	.6
Oneida	60.5	8.6	66.6	7.4	84.7	7.2	235.0	—	12.8	—	—	58.4
Onondaga	7.3	3.6	—	—	10.3	1.4	22.6	5.3	10.6	1.4	9.2	2.0
Ontario	12.3	3.4	—	—	13.7	1.2	30.6	5.8	22.3	1.3	7.7	1.8
Orange	58.3	1.5	2.0	—	52.6	4.6	119.0	40.2	85.4	69.0	16.1	4.7
Orleans	2.8	1.1	—	—	2.8	.2	6.9	1.7	4.0	.4	2.3	.4
Oswego	23.6	10.2	—	—	32.6	4.0	70.4	7.3	19.1	3.9	25.3	5.7
Otsego	55.5	12.9	—	—	83.6	2.6	154.6	5.8	47.3	11.0	6.0	4.3
Putnam	22.2	.5	.4	—	19.1	1.5	43.7	15.3	31.6	24.9	6.0	1.2
Rensselaer	128.5	5.0	4.0	—	71.4	5.8	214.7	16.9	57.2	1.2	10.1	7.8

Continued

Table 89.—*Continued*

County	Sweet birch	Sugar maple	Soft maple	Beech	Ash	Bass-wood	Aspen	Black cherry	Elm	Other hard-woods	Total hard-woods	Total all species
Greene	7.7	30.4	40.6	11.7	15.6	7.9	4.5	12.4	3.2	10.2	320.8	432.5
Hamilton	—	157.5	34.1	92.3	16.5	9.6	35.4	6.4	4.2	46.2	542.3	977.3
Herkimer	—	117.6	84.5	97.0	26.4	11.7	21.5	40.1	37.4	14.3	539.3	796.6
Jefferson	—	50.1	35.3	28.8	6.1	10.1	15.0	11.6	23.2	1.6	213.8	322.0
Lewis	—	143.7	111.2	115.7	34.9	15.1	30.0	51.4	45.8	18.4	685.1	1,051.3
Livingston	.3	27.6	19.0	7.5	11.8	14.9	1.6	6.6	8.8	4.7	132.2	150.4
Madison	.6	47.7	34.9	13.3	18.4	24.5	3.2	10.9	30.3	8.4	229.6	259.4
Monroe	.2	16.9	11.6	4.8	7.3	8.9	1.0	3.9	8.8	2.8	81.3	93.0
Montgomery	.6	11.6	4.5	2.5	3.5	2.1	1.4	.7	3.0	2.4	59.3	108.3
Niagara	.1	12.5	8.7	3.5	5.8	7.5	.8	2.9	7.0	2.2	61.9	70.2
Oneida	—	79.6	60.9	66.2	17.6	8.4	19.9	29.9	22.4	13.8	389.9	624.9
Onondaga	.4	37.0	27.1	9.7	15.8	21.0	2.3	9.2	24.1	6.6	181.7	204.3
Ontario	.5	44.3	30.0	13.3	15.4	20.6	2.4	8.3	21.4	7.4	202.5	233.1
Orange	10.8	31.3	45.1	12.7	17.7	8.2	5.6	13.6	3.6	11.1	375.1	494.1
Orleans	.1	9.8	6.7	2.8	4.7	5.3	.6	2.5	5.5	1.7	48.5	55.4
Oswego	1.3	113.4	81.4	30.8	43.1	60.1	6.9	25.3	88.2	26.2	538.0	608.4
Otsego	2.7	124.5	68.6	56.7	32.7	32.5	5.1	12.9	17.6	6.7	434.4	589.0
Putnam	3.5	9.7	17.8	3.6	5.6	2.7	1.3	5.0	1.6	4.2	134.0	177.7
Rensselaer	2.3	56.6	23.7	13.0	17.4	9.7	7.5	3.5	14.2	9.2	267.3	482.0

Continued

Table 89.—*Continued*

County	White pine	Red pine	Spruce	Fir	Hemlock	Other softwoods	Total softwoods	Select white oaks	Select red oaks	Other oaks	Hickory	Yellow birch
St. Lawrence	90.4	43.7	93.8	38.9	135.6	47.9	450.3	—	15.0	—	—	98.3
Saratoga	171.3	7.6	5.5	—	94.3	9.0	287.7	20.8	73.1	22.6	13.4	11.0
Schenectady	16.8	.7	.5	—	8.4	1.2	27.6	1.9	6.7	2.2	1.2	1.0
Schoharie	47.0	1.9	1.8	—	39.6	3.8	94.1	25.1	63.7	44.9	12.2	4.7
Schuyler	11.8	5.2	—	—	22.3	1.4	40.7	2.2	15.1	3.8	2.2	1.3
Seneca	3.4	.9	—	—	3.7	.3	8.3	1.9	6.2	.4	2.2	.5
Steuben	18.7	7.8	—	—	63.8	.6	90.9	31.8	92.0	6.1	13.3	4.6
Suffolk	27.1	.9	.8	—	11.1	2.3	42.2	11.1	23.0	23.5	6.7	.5
Sullivan	109.1	3.6	4.0	—	103.9	8.8	229.4	69.4	164.5	117.0	29.4	11.2
Tioga	19.6	7.7	—	—	42.1	1.5	70.9	4.0	28.9	7.2	3.6	2.6
Tompkins	18.3	7.2	—	—	33.3	1.5	60.3	3.2	22.5	4.5	3.1	1.9
Ulster	103.4	4.2	3.1	—	81.6	7.4	199.7	49.8	131.1	88.2	23.9	9.1
Warren	163.3	11.7	86.0	27.0	84.9	7.0	379.9	—	29.2	—	—	74.6
Washington	115.3	4.5	3.7	—	58.7	5.2	187.4	17.0	51.9	16.1	8.1	6.0
Wayne	6.1	4.7	—	—	7.9	.8	19.5	4.2	10.2	1.6	7.4	1.3
Westchester	13.0	.2	.3	—	12.5	1.1	27.1	14.8	22.1	24.7	4.8	.8
Wyoming	7.0	4.6	—	—	9.3	1.1	22.0	4.5	11.2	1.6	8.4	1.6
Yates	5.4	1.4	—	—	7.4	.8	15.0	4.6	14.3	.6	4.4	1.2

Continued

Table 89.—*Continued*

County	Sweet birch	Sugar maple	Soft maple	Beech	Ash	Bass-wood	Aspen	Black cherry	Elm	Other hard-woods	Total hard-woods	Total all species
St. Lawrence	—	283.6	172.1	168.8	33.6	52.2	75.8	65.1	94.2	54.7	1,113.4	1,563.7
Saratoga	3.1	74.7	32.2	17.1	21.3	12.1	9.4	4.9	18.6	12.7	347.0	634.7
Schenectady	.3	6.8	2.8	1.5	2.0	1.3	1.0	.5	2.8	1.2	33.2	60.8
Schoharie	7.2	28.1	33.7	11.1	14.8	7.1	4.7	10.5	2.4	9.1	279.3	373.4
Schuyler	1.1	32.3	20.9	12.0	9.8	9.6	2.3	3.3	4.2	1.9	122.0	162.7
Seneca	.1	11.6	8.2	3.5	4.5	5.6	.7	2.6	6.2	2.1	56.3	64.6
Steuben	2.4	151.6	70.5	55.9	30.7	30.8	7.7	21.4	23.2	8.5	550.5	641.4
Suffolk	3.3	8.6	13.0	2.5	8.2	2.1	2.6	2.5	1.8	6.0	115.4	157.6
Sullivan	18.6	66.1	87.0	27.1	33.1	17.4	10.1	27.5	6.1	20.0	704.5	933.9
Tioga	1.8	65.5	39.1	29.5	19.3	20.7	3.2	6.4	6.5	4.1	242.4	313.3
Tompkins	1.5	49.0	29.6	19.2	15.0	14.7	3.7	4.5	5.8	3.4	181.6	241.9
Ulster	13.4	55.9	69.9	21.6	29.0	13.9	8.2	21.7	5.5	18.4	559.6	759.3
Warren	—	127.8	28.0	71.2	13.3	9.9	28.7	5.2	4.4	41.5	433.8	813.7
Washington	2.2	45.4	17.6	10.0	13.9	8.7	6.1	2.7	13.8	8.4	227.9	415.3
Wayne	.3	29.3	19.8	7.8	12.7	17.1	1.4	6.7	15.0	5.0	139.8	159.3
Westchester	4.9	7.3	11.6	3.4	7.1	1.7	1.6	3.0	1.4	4.0	113.2	140.3
Wyoming	.3	34.0	23.2	9.0	14.2	18.5	1.8	7.9	18.6	5.7	160.5	182.5
Yates	.3	24.2	17.2	6.9	8.4	12.1	1.4	4.4	7.1	4.1	111.2	126.2

[1] International ¼-inch rule.

Table 90.—*Selected industries that use wood, and their U.S. Bureau of the Census SIC Codes*

Manufacturing industry (parts of codes 19 to 39)	SIC code
Timber-based industries:	
Lumber and wood products	24
Furniture and fixtures	25
Paper and allied products	26
Primary-manufacturing industries:	
Sawmills and planing mills	242
Veneer and plywood plants	2432
Pulpmills	261
Paper mills, except building paper	262
Paperboard mills	263
Secondary-manufacturing industries:	
(Paper and allied products)	26
Paper and board products	264
Paperboard container and boxes	265
Building paper and building board mills	266
(Parts of textile mill products industry) 2221, 2241, 2254, 2256, 2259, 2262, 2271, 2281, 2282, 2284, 2294, and 2296	22
(Parts of apparel and related products industry) 2311, 2321, 2323, 2327, 2331, 2335, 2337, 2341, 2361, 2363, 2369, 2384, 2391, 2392, and 2399	23
(Parts of chemical and allied products industry)	28
Fibers, plastic materials	2821
Fibers, cellulosic man-made (rayon)	2823
(Furniture and fixtures)	25
Wood furniture, not upholstered	2511
Wood office furniture	2521
Wood partitions and fixtures	2541
All other, excluding metal household furniture (2514), metal office furniture (2522), and metal partitions and fixtures (2542)	
(Millwork and related products)	243
Millwork plants	2431
Prefabricated wood products	2433
Wooden containers	244
Miscellaneous wood products	249
Other than manufacturing industries	
Contract construction	
General contractors, buildings	15
General contractors, except buildings	16
Special trade contractors	17
Transportation and marketing	
Transportation and other public utilities (Parts of industry codes 41 to 49)	
Wholesale trade	50
Retail trade (Parts of industry codes 52 to 59)	

Sources: County Business Patterns, 1967, New York *(17)*. The Economic Importance of Timber in the United States *(6)*.

Table 91.—*Employment in New York State, by selected industries, 1967*

INDUSTRY [1]	Employees	Employees attributed to timber	
	No.	*Percent*	*No.*
TIMBER-SUPPLY			
Forest management	3,000	—	3,000
Harvesting [2]	8,000	—	8,000
Total, timber-supply industries	11,000	100.0	11,000
PRIMARY-MANUFACTURING			
(Lumber and wood products, 24) [3]			
Sawmills and planing mills, 242	3,414	94.7	3,233
Veneer and plywood plants, 2432	706	91.1	643
Total, parts of industry 24	4,120	—	3,876
(Paper and allied products), 26 [3]			
Pulpmills, 261	957	—	813
Paper mills, except bldg. paper, 262	12,342	—	10,491
Paperboard mills, 263	2,453	—	2,085
Total, parts of industry 26	15,752	85.0	13,389
Total, primary-manufacturing industries	19,872	(86.9)	17,265
SECONDARY-MANUFACTURING			
(Paper and allied products, 26) [3]			
Paper and paperboard products, 264	24,177	—	16,682
Paperboard containers and boxes, 265	26,236	—	18,103
Bldg. paper and bldg. board mills, 266	835	—	576
Total, parts of industry 26	51,248	69.0	35,361
Parts of textile mill products, 22 (12 of 31 industries included) [4]	18,589	—	3,104
Parts of apparel and related products, 23 (15 of 40 industries included) [4]	213,596	—	35,671
Parts of chemical and allied products, 28 (2 of 4 industries included) [4]	6,076	—	1,015
Total, parts of industries, 22, 23, 28	238,261	16.7	39,790
Parts of furniture and fixtures, 25			
Total (less metal furniture and metal fixtures, codes 2514, 2522 and 2542)	23,464	36.6	8,588

Continued

Table 91.—*Continued*

INDUSTRY [1]	Employees	Employees attributed to timber	
	No.	*Percent*	*No.*
SECONDARY-MANUFACTURING			
(Millwork and related products, 243)[3]			
Millwork plants, 2431	3,234	—	2,506
Prefabricated wood products, 2433	482	—	374
Total, parts of industry 243	3,716	77.5	2,880
Wooden containers, 244	1,131	83.3	942
Miscellaneous wood products, 249	6,333	(70.0)	4,433
Total, parts of industry 24	11,180	—	8,255
Total, secondary-manufacturing industries	324,153	—	91,994
CONSTRUCTION INDUSTRIES[5]	438,286	20.0	87,657
TRANSPORTATION AND MARKETING OF TIMBER PRODUCTS [6]			
Total, parts of transportation industries	143,618	(13.6)	19,500
Total, parts of wholesale trade	52,947	(67.6)	35,800
Total, parts of retail trade	365,909	(15.1)	55,300
Total, transportation and marketing industries	562,474	(19.7)	110,600
RECAPITULATION OF ABOVE INDUSTRIES			
Timber-supply industries	11,000	100.0	11,000
Lumber and wood products, 24	15,300	79.3	12,131
Furniture and fixtures, parts of 25	23,464	36.6	8,588
Paper and allied products, 26	67,000	72.8	48,750
Textile, apparel, and chemical products (Parts of industries 22, 23, 28)	238,261	16.7	39,790
Construction, transportation, and marketing (15, 16, 17 and parts of 50, 52, 53, 56, 57, 59)	1,000,760	19.8	198,257
Total, all industries	1,355,785	23.5	318,516

Note: Percent attributable to timber derived from Hair's data for 1958 *(6)*.

[1] The SIC codes used by the Bureau of the Census are used to identify each industry.

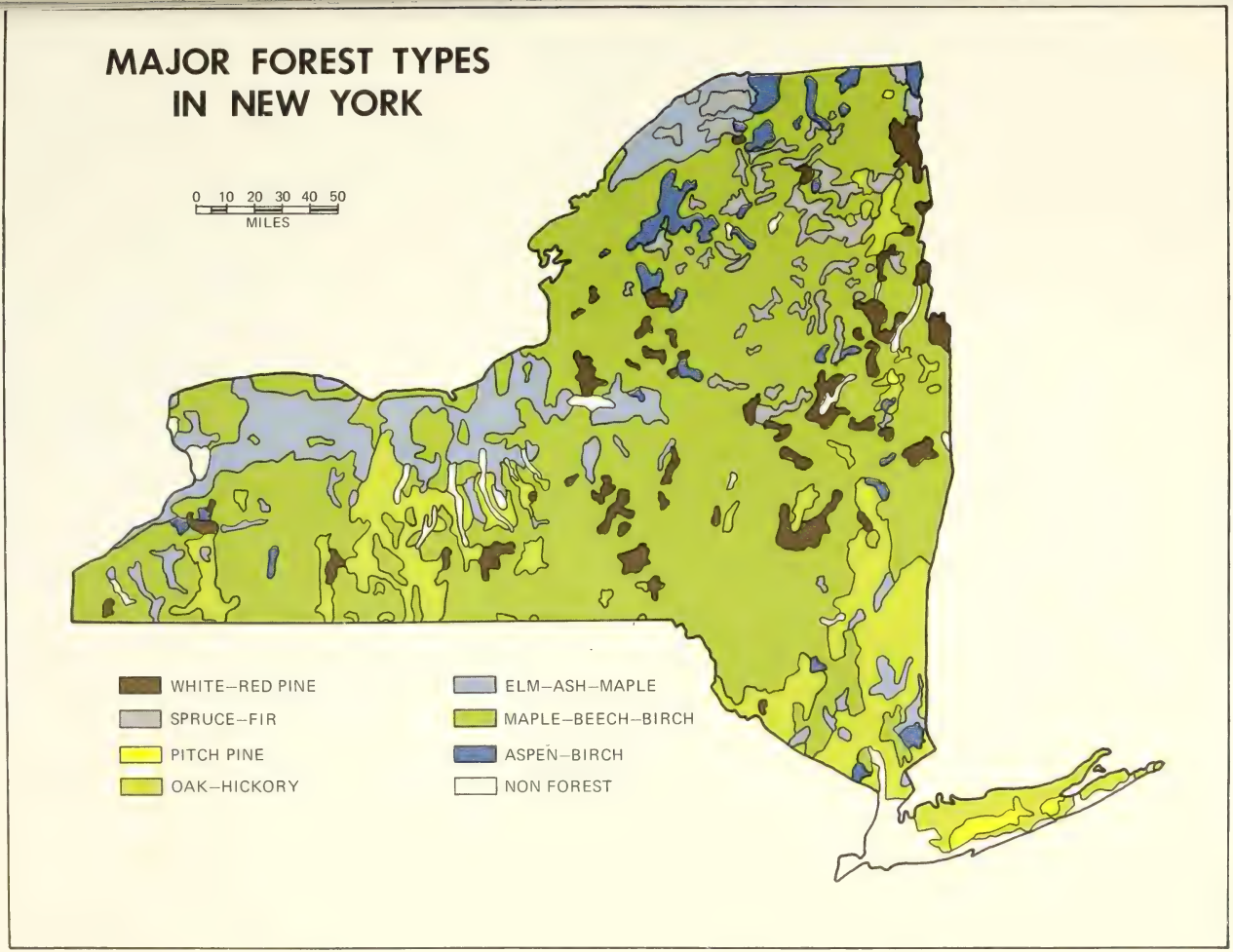
[2] This estimate includes the 592 employees in the "Logging camps and logging contractors" industry, 241, reported in County Business Patterns for New York *(17)*.

[3] The number of employees reported in County Business Patterns *(17)* for industries 24 and 26 were adjusted to equal the number reported in the New York Statistical Yearbook *(12)*.

[4] See the corresponding codes given in table 90.

[5] The contract-construction industries, 15, 16, 17, make up only one-half of construction industry. Force account employment and self employment make up the other half (6).

[6] The transportation industries included are: 42, 44, and 47. The marketing industries included are: 5096, 5097, 5098, 52, 53, 56, 57, and 59.


MAJOR FOREST TYPES
IN NEW YORK
0 10 20 30 40 50
MILES
WHITE–RED PINE
SPRUCE–FIR
PITCH PINE
OAK–HICKORY
ELM–ASH–MAPLE
MAPLE–BEECH–BIRCH
ASPEN–BIRCH
NON FOREST

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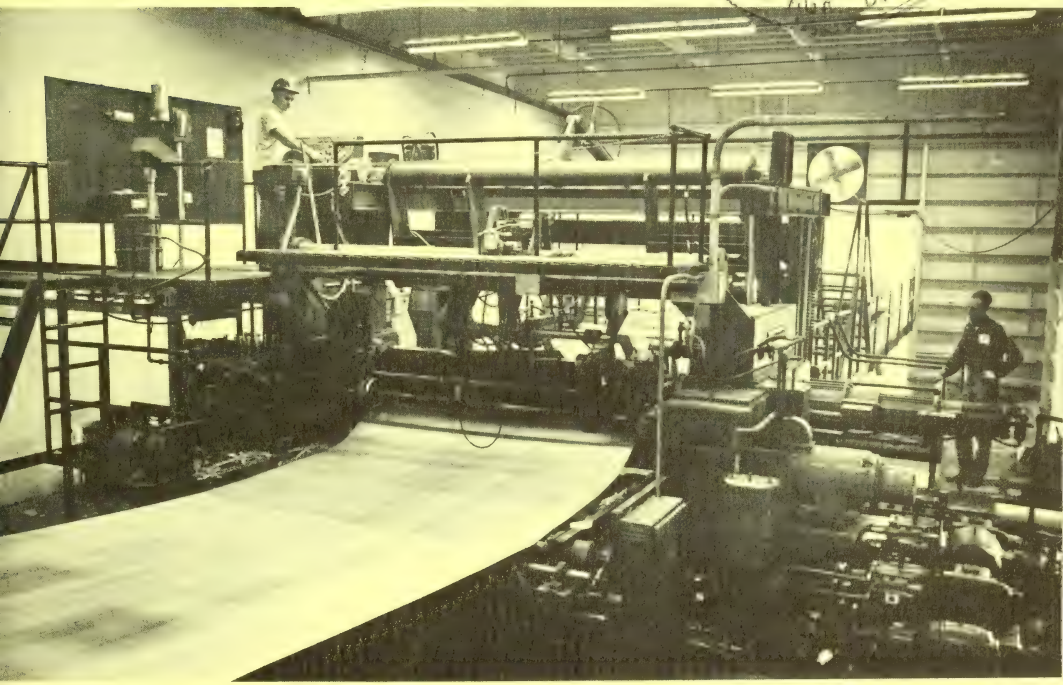
The VENEER INDUSTRY in the Northeast

A 5-year updating of data on veneer-log production and receipts



by James T. Bones
and David R. Dickson

U.S.D.A. FOREST SERVICE RESOURCE BULLETIN NE-21
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NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

COVER PHOTO: Cutting veneer in a modern mill. Photo by courtesy of U.S. Plywood-Champion Papers, Inc.

The VENEER INDUSTRY in the Northeast

A 5-year updating of data on veneer-log production and receipts

THE AUTHORS

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DAVID R. DICKSON, research forester, received his bachelor's degree in forestry from the University of New Hampshire in 1954. He joined the Lake States Forest Experiment Station in 1954. After serving 2 years in the Army he joined the Northeastern Forest Experiment Station in 1957. Since that time he has been stationed at Upper Darby, Pa., where he is associate mensurationist in the Experiment Station's Forest Survey unit.

HIGHLIGHTS

EARLY IN 1969 a survey of the veneer industry in the Northeast was made to determine veneer-log receipts for calendar year 1968, by species and states of origin. The survey revealed the following changes in the past 5 years:

A drop in the number of container veneer plants, offset by an increase in the number of other types of veneer plants.

A 15-percent increase in veneer log production.

A 22-percent increase in receipt of veneer logs and bolts at the plants.

Exports of veneer logs from the Northeast continued to overbalance imports.

BACKGROUND

THE MAIN PURPOSE of the nationwide Forest Survey is to keep abreast of changes in the Nation's timber supply. This is done through periodic statewide forest inventories. However, when regional production data are needed for a single product, or statewide production data are required between inventories, the Forest Survey initiates industrial surveys to obtain these statistics.

In our 1969 survey of the veneer industry, only veneer plants that consume logs and bolts from states in the Northeastern Forest Experiment Station's territory (Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia) were included in the survey. Therefore, veneer logs that were harvested and exported through log brokers or concentrators overseas, or logs imported from foreign countries and converted into veneer at local veneer plants, were not included in the survey. However, the survey did include log shipments to and from Canada.

In this report the 1963 statistics with which these latest data were compared were gathered during a similar veneer-log-production canvass of the eastern United States and reported in *Veneer Log Production and Receipts in Eastern United States, by State and Species, 1963* (USDA Forest Serv. Res. Note WO-6).

PROFILE OF THE INDUSTRY

The veneer manufacturers in the Northeast can be separated into broad classes according to the industries they serve and the products they make. The following three classes of plants were identified in our survey: (1) commercial- and face-veneer manufacturers, who produce veneer for the plywood and furniture industries; (2) container-veneer manufacturers, who fabricate veneer boxes, baskets, and similar containers, mostly for the vegetable and fruit-growing and packing industries; and (3)

specialty-veneer manufacturers, who produce hundreds of items ranging from toothpicks to spoons and tongue depressors (table 1).

Sixty-nine veneer plants were operating in the Northeast in 1968:

Product	*Plants (No.)*
Commercial and face veneer	36
Container veneer	21
Specialty veneer	12

These plants are scattered throughout the Northeastern States. Some plants are located near veneer-log sources or product markets; others are located near major transportation networks and favorable labor markets. Because log requirements are more exacting for face and commercial veneer, these plant owners are willing to pay higher prices for raw materials and to transport logs from greater distances to their plants.

A major contributor to the growth of the commercial- and face-veneer segment of the industry came with the establishment of the Northeast's first softwood plywood plant in Maryland in 1966. This plant was responsible for much of the increase in veneer-log production reported between 1963 and 1968.

Most of the container-veneer plants, located in agricultural sections of the Northeast, procured their veneer logs and sold their products locally.

Nine of the 12 specialty-veneer plants in the Northeast in 1968 were in Maine. These plants provide a stable base for the State's wood-using industries, since their wood requirements and product outputs fluctuate very little from year to year.

PRODUCT EMPHASIS SHIFTS

Though the total number of active veneer plants in the Northeast was the same in 1963 as in 1968, there has been a shift between classes of veneer plants:

Class of plant	*1963 (No.)*	*1968 (No.)*
Commercial and face	30	36
Container	27	21
Specialty	12	12
All classes	69	69

The number of container-veneer plant closings has been offset by the opening of new commercial- and face-veneer plants. Some closings of wood-container plants were due to automation within the agricultural industry on which the plants depended, or to the shifting of large blocks of agricultural land into other land uses. In other cases, the containers manufactured from wood veneer were no longer competitive with containers made from less expensive materials such as plastics and corrugated paper.

PLANT RECEIPTS UP 22 PERCENT

Log receipts at veneer mills in the Northeast were over 154 million board feet (International 1/4-inch rule) in 1968. This represents a 22-percent increase over the 126 million board feet reported in 1963. Maryland, Pennsylvania, and Kentucky reported large gains in log receipts between 1963 and 1968: 260 percent, 172 percent, and 150 percent, respectively.

Overall receipts declined in five of the 14 Northeastern States and rose in six between 1963 and 1968. Connecticut and Rhode Island had no veneer plants, and therefore received no veneer logs. Massachusett's single plant produced African mahogany veneer until 1966, when it ceased operations.

Four states—Maine, Maryland, New York, and Vermont—accounted for 72 percent of the total volume of veneer logs

received in 1968. Maryland's plants received the largest quantity of commercial- and face-veneer logs (27 million board feet), New Jersey plants received the largest quantity of container-veneer logs (9 million board feet), and Maine plants received the largest quantity of specialty-veneer logs (25 million board feet).

PRODUCTION UP 15 PERCENT

Veneer-log production in the Northeast in 1968 was over 175 million board feet (International 1/4-inch rule). This represents an increase of nearly 23 million board feet or 15 percent more than the 153 million board feet reported in 1963. Major con-

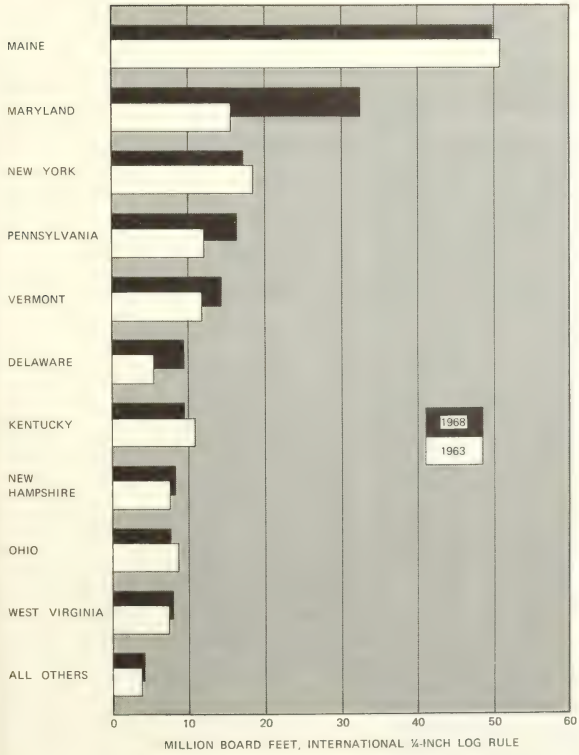


Figure 1. — Veneer-log production in the Northeast, by states, 1963 and 1968.

tributors to this increase were Maryland and Delaware, where production rose 104 percent and 64 percent respectively. Kentucky's production declined the most, from 11 million board feet in 1963 to 8 million board feet in 1968.

Fifty-six percent—over 98 million board feet—of the Northeast's veneer-log and bolt production in 1968 went to plants producing commercial and face veneer. The remaining 77 million board feet of production was divided between container-veneer plants (46 million board feet) and specialty-veneer plants (31 million board feet).

Maine was the largest producer of veneer logs in 1968, accounting for 28 percent of the territory's total production (fig. 1). Maryland was the second largest producer, accounting for 18.5 percent of the Northeastern total.

In both 1963 and 1968, the birches and yellow-poplar accounted for over 50 percent of the total volume of veneer logs produced (fig. 2). Much greater volumes of ash, basswood,

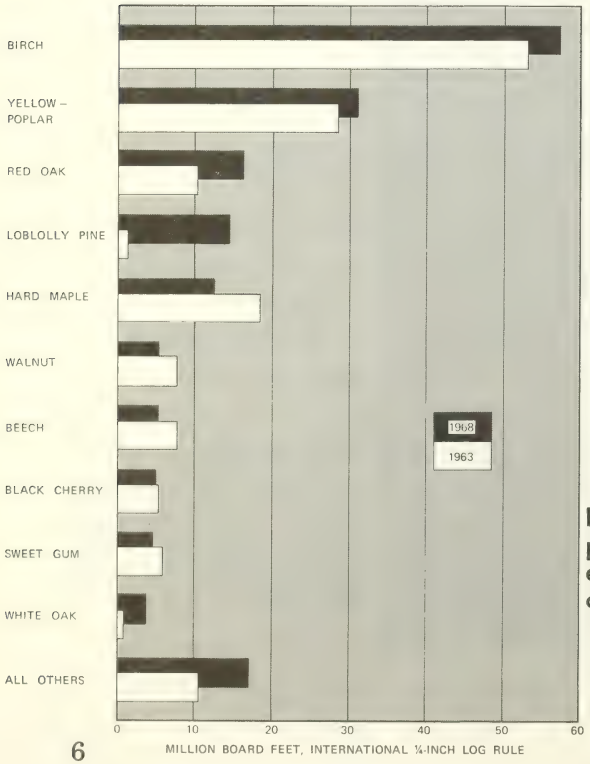


Figure 2. — Veneer-log production in the Northeast, by species, 1963 and 1968.

hickory, white oak, black tupelo, and loblolly pine veneer logs were being produced in 1968 than in 1963, while the production of beech and hard maple veneer logs decreased.

INTERREGIONAL SHIPMENTS

In both 1963 and 1968, the volume of veneer logs shipped out of the Northeast exceeded log receipts from outside the region. This surplus of exports dropped from 26 million board feet (a 17-percent surplus) in 1963 to 21 million board feet (a 12-percent surplus) in 1968.

Though commercial- and face-veneer producers are willing to transport logs great distances, specialty- and container-veneer producers purchase most of their veneer logs close to their plants. Therefore in states like Maine, in which most of the Northeast's specialty-veneer plants are located, a larger percentage of the industry's log requirement comes from within the State (fig. 3).

Presumably those states like West Virginia, which are consuming a larger quantity of veneer logs than they produce and are providing very few of the veneer logs consumed within the state (32 percent in 1968), have the opportunity of furnishing greater quantities of logs to local veneer producers. This presupposes that the species and quality of veneer logs needed by local industry are available.

Generally the states along the Canadian border consumed a higher percentage of the veneer logs cut from within their state boundaries than did the more southerly states. One reason for this might be the restrictions imposed on the shipments of veneer logs to and from Canada.

One can trace the flow of logs between the 14 Northeastern States and surrounding regions. For example, although Kentucky's veneer-log production exceeded its consumption by only 36 percent in 1968, the State's veneer-log suppliers shipped 81 percent of their production to other states. Local veneer plants purchased 4.6 million board feet of veneer logs from neighboring states.

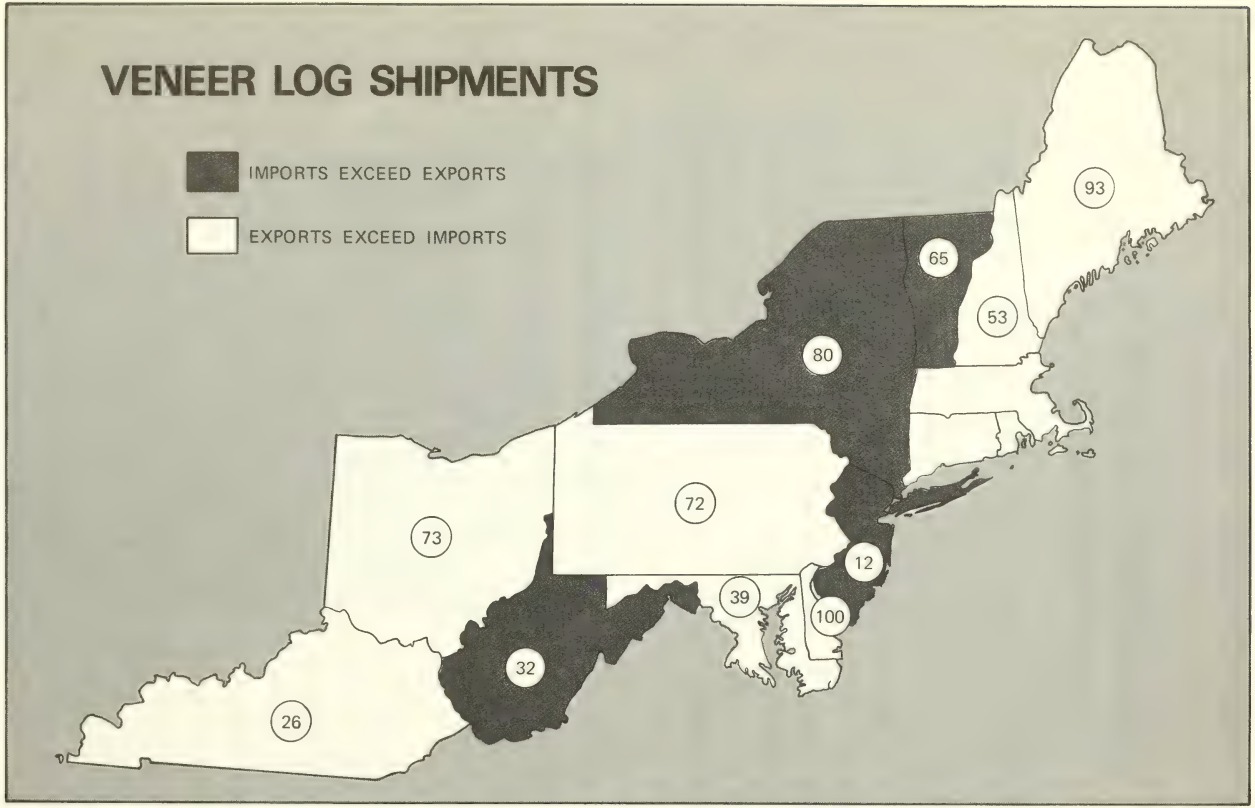


Figure 3.—Balance of veneer-log shipments for the States of the Northeast, 1968. The numbers indicate the percentage of the State's veneer-log consumption that originates in the State. Mass., R. I., and Conn. had no operating veneer plants.

Likewise in Maryland, large quantities of outgoing veneer-log shipments were partially replaced from out-of-state receipts.

Over 40 million board feet of veneer logs were shipped outside the 14 Northeastern States in 1968. More than half of this volume went to North Carolina, the hub of the southeastern furniture industry. Other important recipients of northeastern veneer logs were Indiana and Virginia. Nearly 4 million board feet went to Canada.

LOG AVAILABILITY VARIES AMONG SPECIES

In the Northeast, estimates of sawtimber quality are normally expressed in terms of sawlog grades that are tied to lumber yields. Therefore volume estimates of veneer-quality material must be related to these sawlog grades or tree size. As each periodic forest survey is completed for a state, new log-quality information is published. In addition, resource data for all states in the Northeast were compiled for two specific years—1963 and 1968. Since these data included volumes in veneer-log-size trees for the major northeastern tree species, it was possible to relate these volumes to veneer-log production so that an estimate of the veneer timber supply could be made (table 2).

In 1963, more ash, hickory, and white oak volume was available in relation to the veneer-log harvest than any of the other species listed. By 1968, the veneer industry, recognizing that these species were relatively plentiful, was using them more. Thus, these species showed higher percentage production gains than other hardwoods. In contrast, black walnut and white birch were relatively scarce in 1963, and they showed a decline or nominal gain in 1968.

The available volume of loblolly pine timber per board foot of veneer logs produced in 1968 was lower than that of any of the other species. A shortage of timber suitable for producing softwood veneer logs may be developing in the Middle Atlantic States. In the future, softwood-veneer producers will probably have to procure a greater portion of their annual veneer-log requirements from neighboring regions.

Of the other species listed, black cherry, hard maple, sweetgum, and yellow-poplar seem to have been maintaining a more or less balance between supply and harvest between 1963 and 1968. Production increased slightly for yellow-poplar in 1968 as compared with 1963, and it decreased slightly for the other three species.

■

Table 1.—*Characteristics of the three classes of veneer plants in the Northeast, 1968*

Characteristic	Class of veneer plant		
	Commercial and face	Container	Specialty
Volume of log receipts	2.2 million board feet per plant	1.1 million board feet per plant	2.6 million board feet per plant
Major species received	Red oaks, black cherry, and walnut	Yellow-polar, soft maple, and sweetgum	White birch and hard maple
Size of log procurement area	From 2- to 8-state area	From consuming or neighboring state	From within consuming state
Plant location	Evenly scattered throughout Northeast	Atlantic coastal plain or bordering Great Lakes	Mostly in Maine
Product market areas	Eastern population centers and Southeastern furniture industry	Local agricultural areas	Nationwide

Table 2.—*Relationship of available timber volume* to veneer-log volume cut in the Northeast for selected species and years*

Species	Board feet of resource per board foot cut	
	1963	1968
Pine, loblolly	461	28
Ash	4,499	2,100
Birch, white	86	74
Birch, yellow	193	101
Cherry, black	323	367
Hickory	5,029	1,270
Maple, hard	565	563
Oaks, red	999	660
Oaks, white	5,176	1,687
Sweetgum	162	157
Walnut, black	60	78
Yellow-poplar	195	185

*Net board-foot volume in trees 15 inches and larger (11 inches and larger for white birch) on commercial forest land in the Northeast, January 1963 and January 1968. (Source: Timber Trends in the United States and National Timber Resource Update of 1967).

Table 3.—*Veneer-log and bolt production and receipt relationships in the Northeast, 1963 and 1968*

State	Production			Receipts		
	1963	1968	Change	1963	1968	Change
	Million board feet[1]		*Percent*	*Million board feet*[1]		*Percent*
Connecticut	0.3	0.2	— 26	—	—	—
Delaware	5.8	9.5	+ 64	(D)	(D)	(D)
Kentucky	11.2	8.4	— 25	2.5	6.2	+150
Maine	51.3	49.7	— 3	42.9	44.7	+ 4
Maryland	15.9	32.4	+104	8.1	29.2	+260
Massachusetts	1.5	1.9	+ 28	([2])	—	—
New Hampshire	7.6	8.0	+ 5	(D)	(D)	(D)
New Jersey	1.3	1.5	+ 16	9.2	9.2	— 1
New York	18.1	17.4	— 4	15.6	18.1	+ 16
Ohio	8.6	7.9	— 8	5.0	4.8	— 4
Pennsylvania	12.2	16.5	+ 35	1.7	4.8	+172
Rhode Island	—	—	—	—	—	—
Vermont	12.0	14.1	+ 18	22.6	19.1	— 15
West Virginia	7.0	7.9	+ 13	6.3	8.7	+ 37
All states	152.8	175.4	+ 15	126.5	154.4	+ 22

[1] International ¼-inch log rule.
[2] One plant operated until 1966, producing African mahogany veneer.
(D) Data withheld to avoid disclosure for individual plants.

Table 4.—*Species composition of veneer logs cut in the Northeast, 1963 and 1968*

Species	1963		1968		Change
	Million bd. ft.[1]	*Percent*	*Million bd. ft.*[1]	*Percent*	*Percent*
Ash	0.5	0.3	1.0	0.6	+112
Basswood	1.3	.8	2.6	1.5	+104
Beech	8.0	5.2	5.8	3.3	— 28
Birch	53.3	34.9	57.3	32.6	+ 7
Cherry	6.0	3.9	5.2	3.0	— 13
Cottonwood	1.5	1.0	1.5	.8	+ 2
Elm	3.1	2.0	3.6	2.1	+ 16
Hickory	.8	.6	3.2	1.8	+290
Maple, hard	18.3	12.0	12.8	7.3	— 30
Maple, soft	1.8	1.2	2.2	1.3	+ 26
Oak, red	10.6	7.0	16.5	9.4	+ 55
Oak, white	1.4	.9	4.3	2.4	+214
Sweetgum	6.3	4.1	5.0	2.9	— 20
Sycamore	.8	.5	1.2	.7	+ 49
Tupelo, black	.2	.3	.7	.4	+216
Walnut	7.8	5.1	6.0	3.4	— 23
Yellow-poplar	28.4	18.5	31.3	17.9	+ 10
Other hardwoods	1.0	.6	1.1	.6	+ 17
Total hardwoods	151.1	98.9	161.3	92.0	+ 7
Total softwoods	1.7	1.1	14.1	8.0	+716
All species	152.8	100.0	175.4	100.0	+ 15

[1] International ¼-inch log rule.

Table 5.—*Production of veneer logs in the Northeast, by states and receiving plant classes, 1968*

(Million board feet, International ¼-inch rule)

State	Class of receiving veneer plant		
	Commercial and face	Container	Specialty
Connecticut	0.2	—	—
Delaware	6.2	3.3	—
Kentucky	4.3	4.1	—
Maine	26.8	—	22.9
Maryland	12.2	19.1	1.1
Massachusetts	.8	.3	.8
New Hampshire	7.7	(*)	.3
New Jersey	.4	1.1	—
New York	13.3	2.3	1.8
Ohio	5.1	2.8	—
Pennsylvania	12.2	4.3	—
Rhode Island	—	—	—
Vermont	4.4	6.3	3.4
West Virginia	4.5	2.9	.5
All states	98.1	46.5	30.8

* Less than 50 thousand board feet.

Table 6.—*Receipts of veneer logs in the Northeast, by states and plant classes, 1968*

(Million board feet, International ¼-inch rule)

State	Class of veneer plant		
	Commercial and face	Container	Specialty
Connecticut[1]	—	—	—
Delaware	(D)	(D)	(D)
Kentucky	6.2	—	—
Maine	19.8	—	24.9
Maryland	27.1	2.1	—
Massachusetts[1]	—	—	—
New Hampshire	(D)	(D)	(D)
New Jersey	(*)	9.2	—
New York	13.6	1.3	3.2
Ohio	2.0	2.8	—
Pennsylvania	4.6	0.2	—
Rhode Island[1]	—	—	—
Vermont	8.2	7.6	3.3
West Virginia	8.7	—	—
All states	99.8	23.2	31.4

D Data withheld to avoid disclosure for individual plants.

[1] No veneer plants operating.

* Less than 50 thousand board feet.

Table 7.—*Flow of veneer logs between states in the Northeast, 1968*

(Million board feet, International ¼-inch rule)

State	Production	Interstate shipments[1]		Apparent consumption
		Exports	Receipts	
Connecticut	0.2	0.2	—	—
Delaware	9.5	(D)	(D)	(D)
Kentucky	8.4	6.8	4.6	6.2
Maine	49.7	8.1	3.1	44.7
Maryland	32.4	21.1	17.9	29.2
Massachusetts	1.9	1.9	—	—
New Hampshire	8.0	(D)	(D)	(D)
New Jersey	1.5	.4	8.1	9.2
New York	17.4	2.8	3.5	18.1
Ohio	7.9	4.4	1.3	4.8
Pennsylvania	16.5	13.0	1.3	4.8
Rhode Island	—	—	—	—
Vermont	14.1	1.7	6.7	19.1
West Virginia	7.9	5.1	5.9	8.7
All states	175.4	—	—	154.4

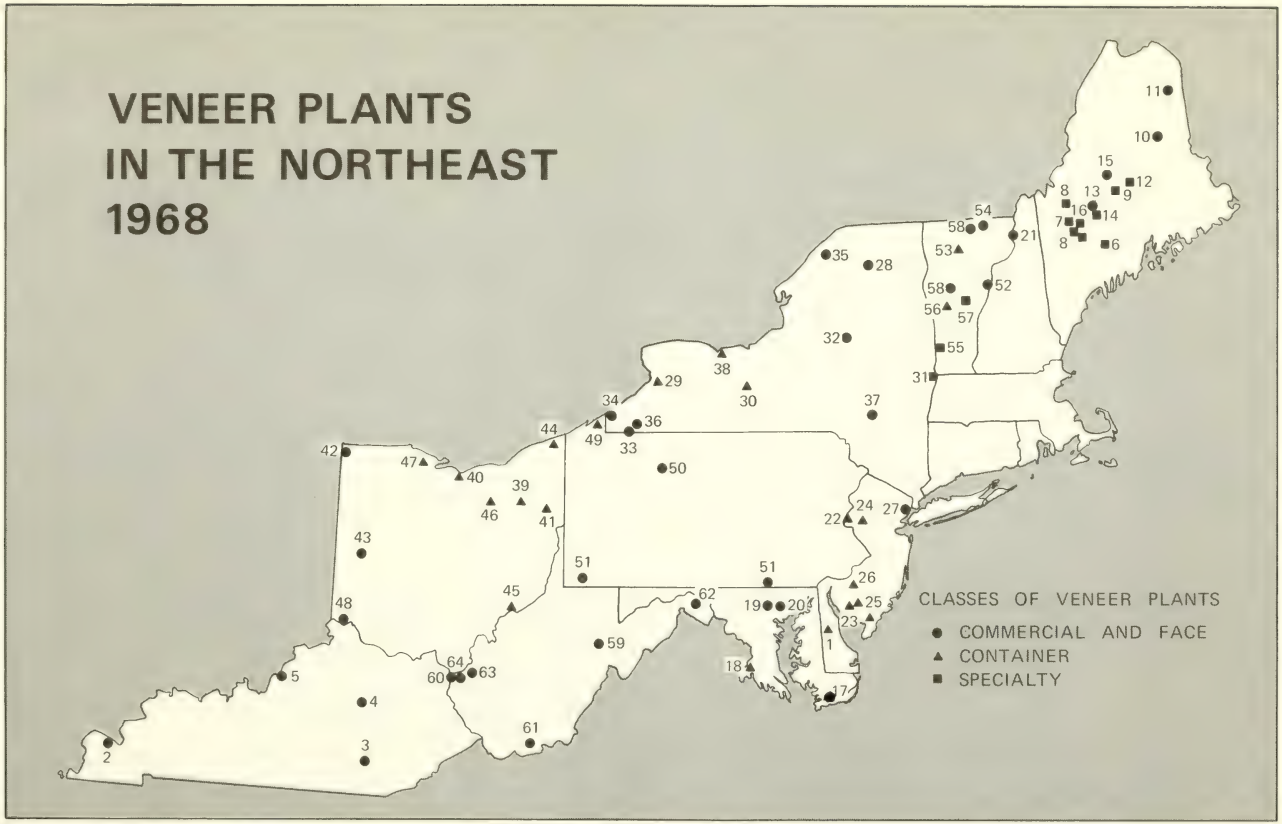
D Data withheld to avoid disclosure for individual plants.
[1] Includes shipments to and from Canada.

Table 8.—*Extraregional recipients of northeast veneer logs, 1968*

(Million board feet, International ¼-inch log rule)

State or Province	Volume received
Indiana	5.8
Michigan	(*)
Missouri	1.9
North Carolina	21.0
Ontario, Canada	.7
Quebec, Canada	3.1
Tennessee	1.4
Virginia	6.5
All states and provinces	40.5

* Less than 50 thousand board feeet.



Location of the active veneer plants in the Northeast, 1968. Numbers are keyed to list of plants on opposite page.

Veneer Plant Locations

Delaware

1 Thomas Minner, Jr. and Son, Felton

Kentucky

2 Central States Veneer Co., Paducah
3 Cumberland Forest Products Co., London
4 The Tomlinson Co., Winchester
5 Wood Mosaic Corp., Louisville

Maine

6 Diamond National Corp., Oakland
7 General Manufacturing Co., Phillips
8 Forester Manufacturing Co., Wilton
(plants in E. Wilton, Strong, and Stratton)
9 Hardwood Products Co., Guilford
10 J. M. Huber Co., Patten
11 Indian Head Plywood Co., Presque Isle
12 National Wood Products Corp., Brownville
13 Scovill Manufacturing Co., Bingham
14 Solon Manufacturing Co., Solon
15 Stover Plywood Corp., Greenville
16 Strong Wood Turning Corp., Strong

Maryland

17 Chesapeake Bay Plywood Corp., Pocomoke City
18 Mulco Products Inc., Pomonkey
19 Stenerson Mahogany Corp., Cockeysville
20 Veneer Inc., Cockeysville

New Hampshire

21 The Brown Co., North Stratford

New Jersey

22 Finger Basket Co., Franklinville
23 Georgia-Pacific Corp., Bridgeton
(plants in Vineland and Bridgeton)
24 J. Hoffman and Son, Califon
25 R. B. Mason & Son, Woodbine
26 Rapp Package Co., Phillipsburg
27 I. T. Williams & Son, Carteret

New York

28 Adirondack Plywood Corp., Tupper Lake
29 E. Aurora Basket Co., Wales
30 Barden and Robeson Corp., Penn Yan
31 W. J. Cowee, Berlin
32 Jamestown Veneer Co., Poland
33 Knight Veneer and Panel Corp., Falconer
34 Ripley Lbr. Co., Ripley
35 Riverside Veneer Co., Heuvelton
36 Robbins Veneer Co., Falconer
37 Williamson Co., Fleischmans
38 Webster Basket Co., Webster

Ohio

39 Asplin Basket Co., Hartville
40 Berlin Fruit Co., Berlin Heights
41 Decort Basket Co., Salem
42 Edon Manufacturing Co., Edon
43 Hartzell Industries, Inc., Piqua
44 Kingsville Basket Co., Kingsville
45 Marietta Fruit Package and Lbr. Co., Marietta
46 McIntire Basket Co., Creston
47 Ottawa Basket Co., Elmore
48 P. V. Shoe Walnut Co., Cincinnati

Pennsylvania

49 Greenfield Basket Co., Northeast
50 Weyerhaeuser Co., Ridgeway
51 Williamson Veneer Co., New Freedom
(plants in New Freedom and Waynesburg)

Vermont

52 Bradford Veneer and Panel Co., Bradford
53 Consolidated Electronics Ind., Morrisville
54 Indianhead Plywood Corp., Newport
55 Lewis Bros. Inc., West Rupert
56 Rutland Plywood Corp., Center Rutland
57 Vermont Pacific Corp., Bethel
58 Weyerhaeuser Co., Hancock
(plants in Hancock and Troy)

West Virginia

59 Allegheny Lumber Co., Elkins
60 Breece Veneer Co., Kenova
61 The Dean Co., Princeton
62 Martinsburg Veneer Corp., Martinsburg
63 Ohio Valley Wood Products Corp., Ona
64 Wood Mosaic Corp., Huntington

ACKNOWLEDGMENT

THE SUCCESS of a survey depends upon the percentage of responses received from the population sampled and the effort put forth by the respondents in providing information. We are grateful to the Northeast's veneer industry for their immediate and accurate responses. All veneer plants known to be operating in 1968 in the Northeast provided data for this survey.

THE FOREST SERVICE of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

PULPWOOD PRODUCTION in the Northeast 1969

DEC 15 1970

U.S.D.A. FOREST SERVICE RESOURCE BULLETIN NE-22
1970

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

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PULPWOOD PRODUCTION

in the Northeast

1969

by James T. Bones
and David R. Dickson

Background

THIS ANNUAL REPORT is based on a canvass of all pulpmills in the Northeast that use wood—either from roundwood or plant residues—as a basic raw material for a variety of products. Mills that use pulpwood as a raw material in producing insulation board and hardboard were also included in the canvass.

The production-from-roundwood statistics reported in this bulletin are based upon mill receipts, which are subject to fluctuations caused by uneven wood-inventory buildups or liquidations from year to year. The plant residues are received at the mill mostly in chip form; however, some coarse residues are being chipped at the mill site. Origins of mill receipts of pulpwood from roundwood are reported by county where cut; however, pulpwood from plant residues can be traced only to the state where it was produced. Even so, some of the logs from which the residues came were probably cut in states other than the one in which they were processed.

1969 in Retrospect

Public concern over the Nation's mounting air- and water-pollution problems has affected the Northeast's pulp industry in several ways. Aging and inefficient pulpmills are being closed as new federal and state anti-pollution guidelines are making it clear that continued operations will necessitate substantial investments in anti-pollution equipment.

These mills are either being replaced by new facilities, or market pulp is being purchased to run existing paper mills in integrated operations. In 1969, incoming Canadian woodpulp shipments increased by 556,990 tons, an 18 percent gain over the previous year. New pulpmill projects allow for increased costs of 10 to 20 percent

for pollution-abatement equipment that will meet or exceed present standards.

An informal survey of Maine pulpmills revealed that approximately $7.1 million has been spent in recent years for water- or air-pollution control equipment. By contrast, the estimated cost of pollution-control projects to be completed in 1970 is $16.5 million, and another $9 million is allocated for projects that are now in the planning stage. These figures were probably outdated soon after they were gathered; yet they are indicative of the industry's attempts to aline itself with the wishes of the people.

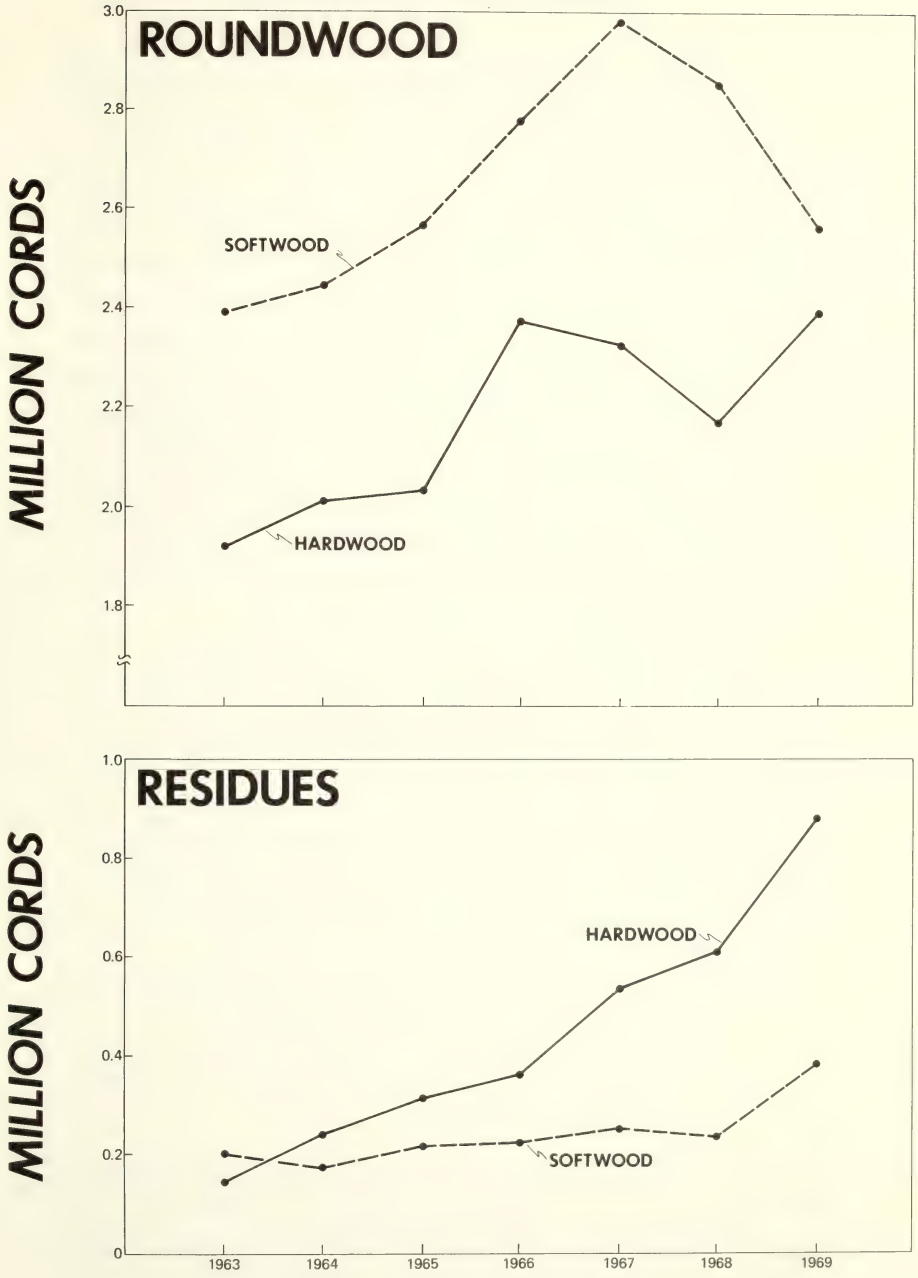
The use of wood residues generated by other primary wood manufacturers continued to climb in 1969. This year was the first in which pulpmills reported receiving sawdust as a raw material. Chips from roundwood have also become an important factor in the Northeast. At present many different types of chip harvesters and utilizers are being tested at locations ranging from the stump to the pulpmill. Harvesters at woods operations concentrate on small tree-length roundwood, while those at concentration yards or the pulpmill provide versatility by handling both roundwood and coarse plant residues.

Kentucky doubled its installed pulping capacity when Western Kraft Corporation's new pulpmill began operating at Hawesville in June 1969. A third pulpmill—Westvaco's $40-million facility at Wickliffe—has been building a wood inventory during 1969 and plans to begin production in the spring of 1970.

Pulpwood Production Increases

Pulpwood production in the Northeast increased to record levels in 1969, climbing more than 4 percent above the 5,961,600 cords reported in 1968 and more than 3 percent above the previous record high reported in 1967. This new record of 6,220,600 cords was due mainly to the addition of new mills and the increased production of chips from plant residues in the Station's 14-state territory (Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia).

Figure 1.—Pulpwood production for all states, by years and sources of wood, in millions of cords.



Although roundwood production from softwood trees continued the decline that began in 1968, increases in both roundwood production from hardwoods and production from plant residues more than offset the drop (fig. 1). This year is the first in which total pulpwood production from hardwoods exceeded that from softwoods in the Northeast.

Receipts of pulpwood at northeastern woodpulp mills totaled 6,444,900 cords in 1969. Of this, 3,145,700 cords came from softwood trees and 3,299,200 cords from hardwood trees (table 2). Thus total receipts exceeded total production by 224,300 cords. Six of the 14 states (Connecticut, Delaware, Kentucky, Massachusetts, Vermont, and West Virginia) produced more wood than they received. Delaware and West Virginia had no operating woodpulp mills; Vermont, Massachusetts, and Connecticut each had one.

Production and receipts of hardwood pulpwood continue to be more or less in balance, while the deficit of softwood pulpwood is made up by Canadian pulpwood shipments into the Northeastern States.

Pulpwood from Roundwood Decreases

The production of pulpwood from roundwood decreased 73,300 cords—1.5 percent below that of 1968. This was the second year that production declined. In 1969 roundwood production was 4,947,600 cords, compared to 5,020,900 cords in 1968 and 5,313,300 cords in 1967.

This year's pulpwood production from roundwood was up from 1968 in five states—Connecticut, Delaware, Kentucky, New York, and Pennsylvania. However, Maine, New Hampshire, New Jersey, and Vermont each registered production decreases of over 10,000 cords.

Pulpmill receipts of pulpwood from roundwood in the Northeast totaled 5,226,500 cords in 1969 (table 5). This was a drop of 137,500 cords from the 5,364,000 received in 1968. Receipts exceeded roundwood production by 278,900 cords—a 6-percent surplus.

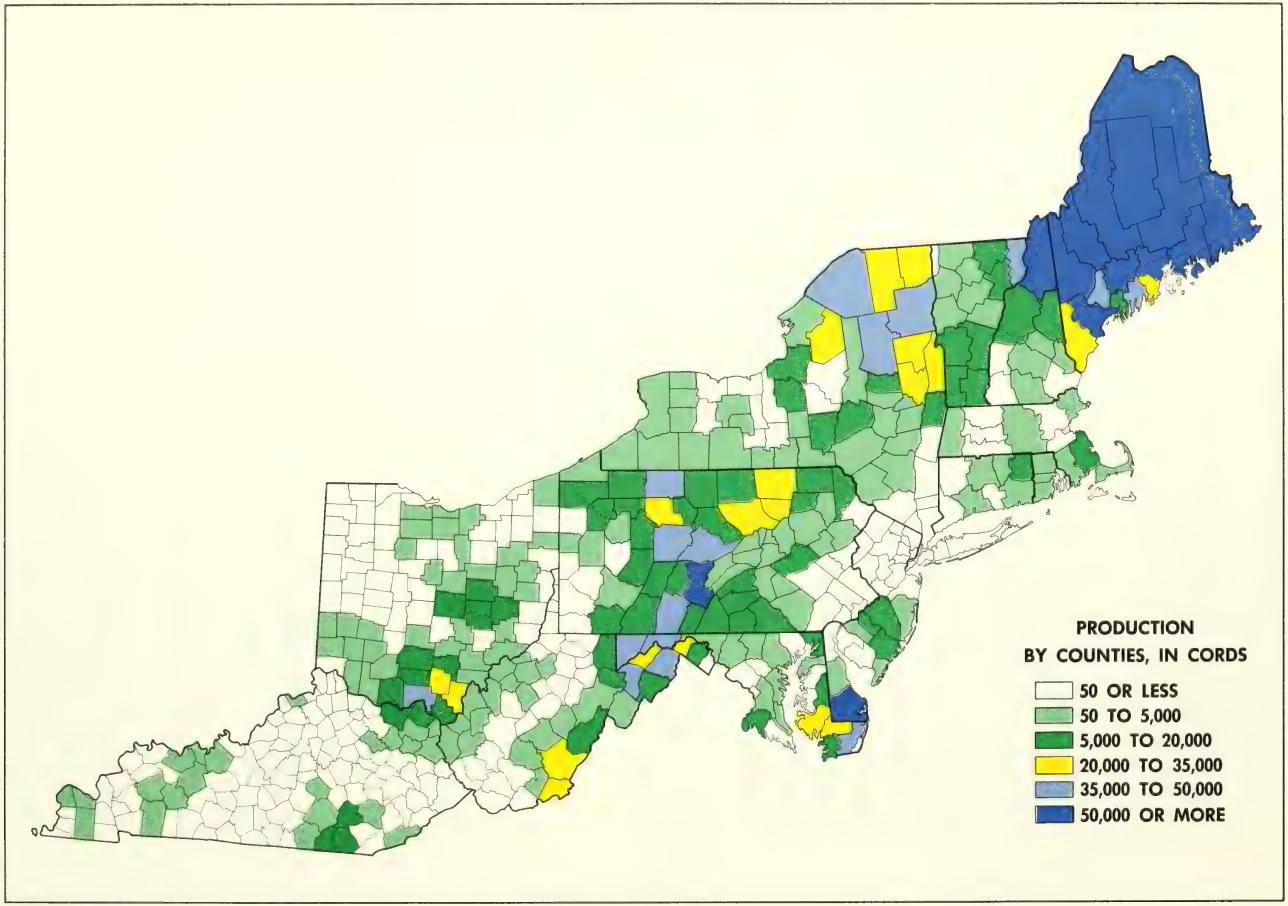
Fourteen Counties Top 50-Thousand-Cord Mark

Fourteen counties in four states produced over 50 thousand cords of pulpwood from roundwood in 1969 (fig. 2). This is a 3-county drop from 1968 and a 6-county drop from the 20-county total of 1967. Huntingdon County, Pennsylvania, was restored to the list of high producers after having fallen below the 50-thousand-cord production level in 1968. Cumberland County, Maine, was included in this year's list for the first time since 1966. Clearfield County, Pennsylvania; Essex County, Vermont; Lincoln County, Maine; Hampshire County, West Virginia; and Garrett County, Maryland were not among the counties producing over 50 thousand cords of pulpwood from roundwood in 1969.

Counties that produced over 50 thousand cords of pulpwood from roundwood in 1969 are listed below:

	County and State	*Production (thousand cords)*
1.	Aroostook, Maine	522.5
2.	Penobscot, Maine	390.6
3.	Somerset, Maine	385.6
4.	Washington, Maine	322.8
5.	Piscataquis, Maine	315.9
6.	Oxford, Maine	214.2
7.	Coos, New Hampshire	203.8
8.	Franklin, Maine	123.5
9.	Sussex, Delaware	77.0
10.	Hancock, Maine	65.1
11.	Kennebec, Maine	62.2
12.	Cumberland, Maine	56.4
13.	Waldo, Maine	55.6
14.	Huntingdon, Pennsylvania	54.4

Figure 2.—The geographical pattern of pulpwood production from roundwood in the Northeast, 1969.



Wood Chip Production Gains 35 Percent

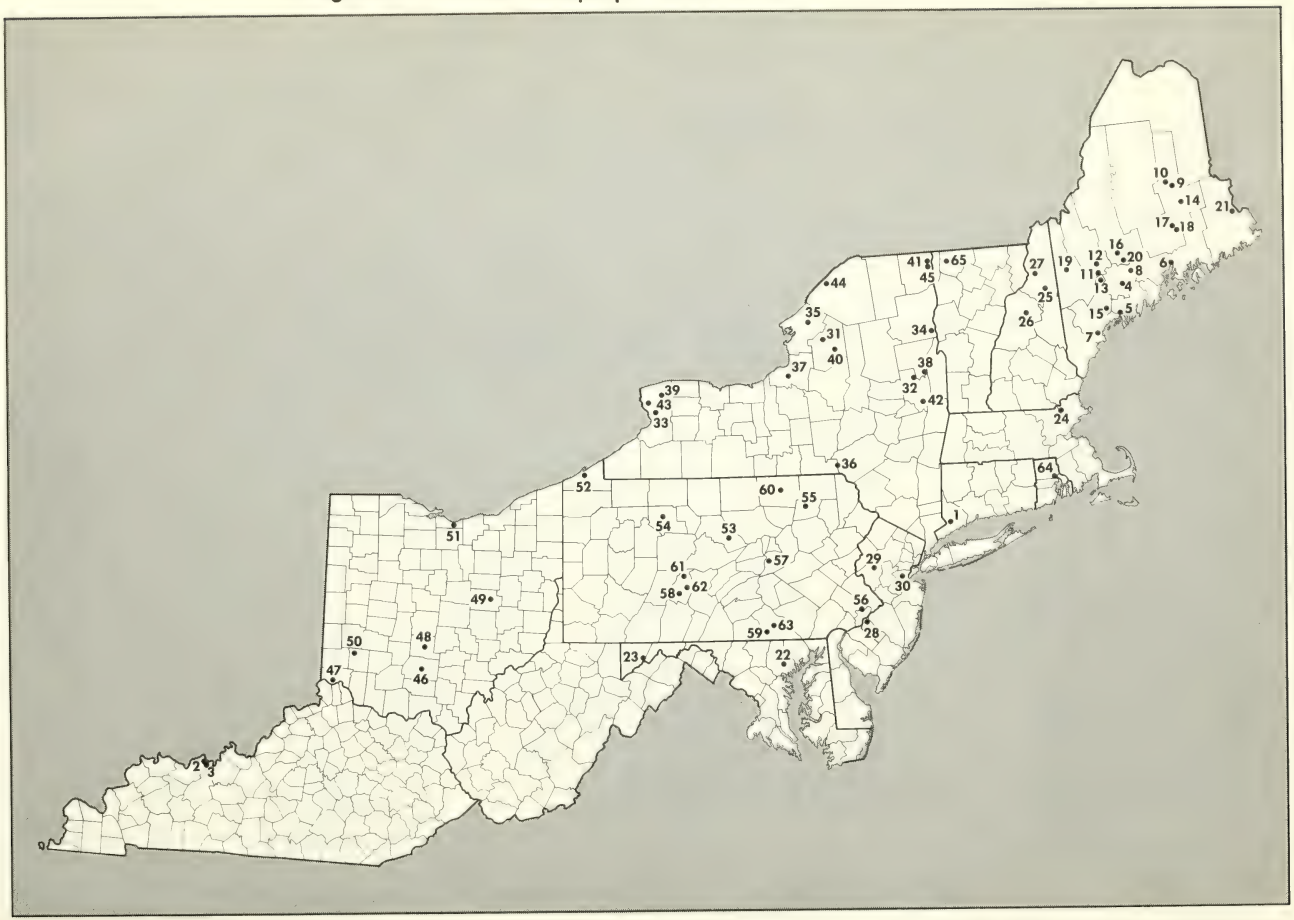
For the first time all states in the Northeast reported some chip production. Major contributors to the 35-percent overall gain in chip production were Pennsylvania and Ohio. These states more than doubled their production of chips from plant residues. A comparison of pulpwood chip production from plant residues by states between 1968 and 1969 is given below:

State	*1968 (thousand cords)*	*1969 (thousand cords)*	*Change (percent)*
Connecticut	—	0.7	—
Delaware	—	1.7	—
Kentucky	94.2	84.3	— 11
Maine	210.1	241.0	+ 15
Maryland	98.6	144.2	+ 46
Massachusetts	9.2	7.8	— 15
New Hampshire	85.6	90.8	+ 6
New Jersey	1.8	.4	— 78
New York	100.7	111.6	+ 11
Ohio	33.5	68.5	+104
Pennsylvania	159.0	336.4	+112
Rhode Island	—	1.3	—
Vermont	28.6	34.9	+ 22
West Virginia	119.4	149.4	+ 25
Total	940.7	1,273.0	+ 35

The production of chips from plant residues rose from 940,700 cord equivalents in 1968 to 1,273,000 cords in 1969. In 1968 chips from plant residues accounted for nearly 16 percent of the Northeast's total pulpwood production, while in 1969 this proportion jumped to over 20 percent of the total.

Softwood chip production from plant residues rose only 17.1 percent between 1968 and 1969, while hardwood chip production rose 45.3 percent. This year's gain in the production of hardwood chips represents the largest percentage increase registered since 1967, when a 47.8-percent increase occurred.

Figure 3.—Active woodpulp mills in the Northeast, 1969.



OPERATING PULPMILLS AND HARDBOARD AND INSULATION BOARD PLANTS IN THE NORTHEAST, 1969

Number	Mill and Location	Capacity (tons/24 hrs.)
	CONNECTICUT	
1.	Tilo Company, Stratford	35
	KENTUCKY	
2.	Wescor Corp., Hawesville	230
3.	Western Kraft Corp., Hawesville	230
	MAINE	
*4.	Statler Tissue Co., Augusta	270
5.	Pejepscot Paper Div., Hearst Corp., Brunswick	115
6.	St. Regis Paper Co., Bucksport	300
7.	S. D. Warren Div., Scott Paper Co., Cumberland Mills	275
8.	Scott Paper Co., Winslow	430
9.	Great Northern Paper Co., E. Millinocket	750
*10.	Great Northern Paper Co., Millinocket	1,375
11.	International Paper Co., Chisholm	225
*12.	International Paper Co., Jay	675
13.	International Paper Co., Livermore Falls	95
14.	Lincoln Pulp and Paper Co., Lincoln	210
15.	U. S. Gypsum Co., Lisbon Falls	100
16.	Kennebec River Pulp and Paper Co., Madison	100
17.	Old Town Pulp Products Div., Lily Tulip Corp., Old Town	90
*18.	Penobscot Div., Diamond International Corp., Old Town	550
20.	Keyes Fibre Corp., Shawmut	100
*19.	Oxford Paper Div., Ethyl Corp., Rumford	670
*21.	St. Croix Div., Georgia Pacific Corp., Woodland	1,100
	MARYLAND	
22.	Congoleum-Nairn Inc., Finksburg	200
23.	Westvaco Corp., Luke	800
	MASSACHUSETTS	
24.	Oxford Paper Div., Ethyl Corp., Lawrence	50
	NEW HAMPSHIRE	
25.	Brown Co., Berlin	700
26.	Franconia Paper Co., Lincoln	90
*27.	Groveton Paper Div., Diamond International Corp., Groveton	425
	NEW JERSEY	
28.	G.A.F. Corp., Gloucester City	192
29.	Johns-Manville Products Corp., Manville	200
30.	Philip Carey Corp., Perth Amboy	50
	NEW YORK	
31.	J. P. Lewis Co., Beaver Falls	60
32.	International Paper Co., Corinth	255
33.	International Paper Co., N. Tonawanda	140
34.	International Paper Co., Ticonderoga	190
*35.	St. Regis Paper Co., Deferiet	300
36.	Celotex Corp., Deposit	150
37.	Armstrong Cork Co., Fulton	260
38.	Finch-Pruyn Co., Glen Falls	350
39.	Flintkote Co., Lockport	12
40.	Gould Paper Div., Georgia Pacific Corp., Lyons Falls	120
41.	Georgia Pacific Corp., Plattsburgh	70
42.	Westvaco, Mechanicville	158
43.	Kimberly-Clark Corp., Niagara Falls	100

CONTINUED

(Continued)

Number	Mill and Location	Capacity (tons/24 hrs.)
44.	Diamond International Corp., Ogdensburg	50
45.	Diamond International Corp., Plattsburg	50
	OHIO	
46.	Mead Corp., Chillicothe	600
47.	Philip Carey Corp., Cincinnati	100
48.	Container Corp. of America, Circleville	240
49.	Stone Container Corp., Coshocton	450
50.	Logan-Long Co., Franklin	60
51.	Certain-Teed Products Corp., Avery	90
	PENNSYLVANIA	
52.	Hammermill Paper Co., Erie	375
53.	Hammermill Paper Co., Lock Haven	80
*54.	Penntech Papers Inc., Johnsonburg	270
55.	Charmin Paper Products Div., Proctor & Gamble Co., Mehoopany	Unknown
56.	Celotex Div., Jim Walter Corp., Philadelphia	160
57.	Celotex Div., Jim Walter Corp., Sunbury	150
58.	Bare Paper Div., Combined Paper Mills, Roaring Spring	180
59.	P. H. Glatfelter Co., Spring Grove	500
60.	Masonite Corp., Towanda	Unknown
61.	Westvaco, Tyrone	152
62.	Westvaco, Williamsburg	160
63.	Certain-Teed Products Corp., York	75
	RHODE ISLAND	
64.	Bird and Son, Inc., Philadelphia	Unknown
	VERMONT	
65.	Missisquoi Specialty Board Div., Standard Packaging Corp., Sheldon Springs	44

* More than one pulpmill operating.

Table 1.—Total production of pulpwood in the Northeast, by sources and states, 1969

(In thousands of rough cords)[1]

State	Source		
	From roundwood	From plant residues	From all sources
Connecticut	13.8	0.7	14.5
Delaware	78.2	1.7	79.9
Kentucky	83.6	84.3	167.9
Maine	2,668.2	241.0	2,909.2
Maryland	214.4	144.2	358.6
Massachusetts	19.1	7.8	26.9
New Hampshire	228.5	90.8	319.3
New Jersey	29.2	.4	29.6
New York	365.2	111.6	476.8
Ohio	230.9	68.5	299.4
Pennsylvania	621.9	336.4	958.3
Rhode Island	7.7	1.3	9.0
Vermont	107.2	34.9	142.1
West Virginia	279.7	149.4	429.1
All states	4,947.6	1,273.0	6,220.6

[1] 128 cubic feet of wood, bark, and air space.

Table 2.—Total production and receipts of pulpwood in the Northeast, by states and species groups, 1969

(In thousands of rough cords)

State	Total production		Total receipts		Production surplus (+) or deficit (—)
	Softwood	Hardwood	Softwood	Hardwood	
Connecticut	7.4	7.1	(D)	(D)	+ (D)
Delaware	76.3	3.6	—	—	+ 79.9
Kentucky	34.4	133.5	—	62.1	+105.8
Maine	2,082.6	826.6	2,272.0	860.2	—223.0
Maryland	229.5	129.1	135.3	288.9	— 65.6
Massachusetts	13.0	13.9	(D)	(D)	+ (D)
New Hampshire	141.4	177.9	242.4	300.0	—223.1
New Jersey	21.9	7.7	28.4	19.5	— 18.3
New York	103.2	373.6	212.1	455.0	—190.3
Ohio	12.2	287.2	4.6	386.7	— 91.9
Pennsylvania	66.7	891.6	205.3	892.5	—139.5
Rhode Island	4.6	4.4	(D)	(D)	— (D)
Vermont	73.0	69.1	(D)	(D)	+ (D)
West Virginia	88.3	340.8	—	—	+429.1
All states	2,954.5	3,266.1	3,145.7	3,299.2	—224.3

(D) Data withheld to avoid disclosure for individual mills.

Table 3.—Pulpwood production from roundwood in the Northeast, by states and species groups, 1969

(In thousands of rough cords)

State	Softwood				Hardwood				Total production
	Cut and retained in state	Shipped to other states		Total softwood	Cut and retained in state	Shipped to other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.4	3.3	—	6.7	—	7.1	—	7.1	13.8
Delaware	—	24.7	51.6	76.3	—	1.3	0.6	1.9	78.2
Kentucky	—	.3	27.2	27.5	8.5	25.2	22.4	56.1	83.6
Maine	1,832.1	53.3	4.9	1,890.3	729.8	48.1	—	777.9	2,668.2
Maryland	14.4	22.0	95.2	131.6	69.0	13.5	.3	82.8	214.4
Massachusetts	—	13.0	—	13.0	1.0	5.1	—	6.1	19.1
New Hampshire	63.9	17.3	—	81.2	140.5	6.8	—	147.3	228.5
New Jersey	21.6	—	—	21.6	7.6	(*)	—	7.6	29.2
New York	97.6	.5	3.1	101.2	242.7	5.4	15.9	264.0	365.2
Ohio	.4	11.8	—	12.2	218.6	.1	—	218.7	230.9
Pennsylvania	57.3	1.9	—	59.2	514.9	47.8	—	562.7	621.9
Rhode Island	4.6	—	—	4.6	3.1	—	—	3.1	7.7
Vermont	11.3	50.4	—	61.7	—	45.5	—	45.5	107.2
West Virginia	—	66.7	11.9	78.6	—	130.8	70.3	201.1	279.7
All states	2,106.6	265.2	193.9	2,565.7	1,935.7	336.7	109.5	2,381.9	4,947.6

* Less than 50 cords.

Table 4.—Pulpwood chip production from plant residues in the Northeast, by states and species groups, 1969[1]

(In thousands of rough cord equivalents)

State	Softwood				Hardwood				Total production
	Produced and retained in state	Shipped to other states		Total softwood	Produced and retained in state	Shipped to other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	0.7	—	—	0.7	—	—	—	—	0.7
Delaware	—	—	—	—	—	1.7	—	1.7	1.7
Kentucky	—	2.6	4.3	6.9	24.7	13.7	39.0	77.4	84.3
Maine	181.5	10.8	—	192.3	44.4	4.3	—	48.7	241.0
Maryland	.3	37.9	59.7	97.9	6.9	39.4	—	46.3	144.2
Massachusetts	—	—	—	—	3.0	4.8	—	7.8	7.8
New Hampshire	47.9	12.3	—	60.2	23.5	7.1	—	30.6	90.8
New Jersey	.3	—	—	.3	.1	—	—	.1	.4
New York	1.0	1.0	—	2.0	87.0	10.2	12.4	109.6	111.6
Ohio	—	—	—	—	68.5	—	—	68.5	68.5
Pennsylvania	7.2	.3	—	7.5	299.6	29.3	—	328.9	336.4
Rhode Island	—	—	—	—	—	1.3	—	1.3	1.3
Vermont	—	11.3	—	11.3	—	23.6	—	23.6	34.9
West Virginia	—	4.6	5.1	9.7	—	77.4	62.3	139.7	149.4
All states	238.9	80.8	69.1	388.8	557.7	212.8	113.7	884.2	1,273.0

[1] Includes sawmill slabs and edgings, veneer cores, and post and pole trimmings.

Table 5.—Pulpwood receipts from roundwood in the Northeast, by states and species groups, 1969

(In thousands of rough cords)

State	Softwood				Hardwood				All receipts
	Cut and retained in state	Receipts from other states		Total softwood	Cut and retained in state	Receipts from other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.4	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Delaware	—	—	—	—	—	—	—	—	—
Kentucky	—	—	—	—	8.5	—	6.7	15.2	15.2
Maine	1,832.1	1.5	216.3	2,049.9	729.8	2.9	77.6	810.3	2,860.2
Maryland	14.4	62.0	55.1	131.5	69.0	147.0	6.5	222.5	354.0
Massachusetts	—	(D)	—	(D)	1.0	(D)	—	(D)	(D)
New Hampshire	63.9	50.5	28.2	142.6	140.5	76.8	37.6	254.6	397.5
New Jersey	21.6	—	—	21.6	7.6	—	—	7.6	29.2
New York	97.6	68.9	44.6	211.1	242.7	31.6	60.1	334.4	545.5
Ohio	.4	—	.1	.5	218.6	27.8	4.7	251.1	251.6
Pennsylvania	57.3	65.7	33.1	156.1	514.9	34.0	3.0	551.9	708.0
Rhode Island	4.6	(D)	—	(D)	3.1	(D)	—	(D)	(D)
Vermont	11.3	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
West Virginia	—	—	—	—	—	—	—	—	—
All states	2,106.6	265.1	386.5	2,758.2	1,935.7	336.4	196.2	2,468.3	5,226.5

(D) Data withheld to avoid disclosure for individual mills.

Table 6.—Pulpwood chip receipts from plant residues in the Northeast, by states and species groups, 1969[1]

(In thousands of rough cord equivalents)

State[2]	Softwood				Hardwood				Total receipts
	Produced and retained in state	Receipts from other states		Total softwood	Produced and retained in state	Receipts from other states		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	0.7	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Kentucky	—	—	—	—	24.7	—	22.2	46.9	46.9
Maine	181.5	12.5	28.1	222.1	44.4	0.4	5.1	49.9	272.0
Maryland	.3	3.5	—	3.8	6.9	58.2	1.3	66.4	70.2
Massachusetts	—	(D)	(D)	(D)	3.0	(D)	(D)	(D)	(D)
New Hampshire	47.9	22.8	29.1	99.8	23.5	11.8	9.8	45.1	144.9
New Jersey	.3	6.5	—	6.8	.1	11.8	—	11.9	18.7
New York	1.0	—	—	1.0	87.0	21.1	12.5	120.6	121.6
Ohio	—	4.0	.1	4.1	68.5	58.7	8.4	135.6	139.7
Pennsylvania	7.2	31.4	10.6	49.2	299.6	40.0	1.0	340.6	389.8
All states	238.9	80.7	67.9	387.5	557.7	212.9	60.3	830.9	1,218.4

[1] Includes sawmill slabs and edgings, veneer cores, and post and pole trimmings.
[2] States with no receipts are omitted.
(D) Data withheld to avoid disclosure for individual mills.

Table 7.—Pulpwood from roundwood received from states outside the Northeast, by states (or provinces) of origin and species groups, 1969

(In thousands of rough cords)

Receiving state[1]	State (or province) of origin	Total softwood	Total hardwood	All species
Kentucky	Illinois	—	0.5	0.5
	Indiana	—	2.6	2.6
	Missouri	—	.9	.9
	Tennessee	—	2.7	2.7
Maine	New Brunswick	208.4	68.5	276.9
	Quebec	7.9	9.1	17.0
Maryland	Virginia	55.1	6.5	61.6
New Hampshire	New Brunswick	7.6	.1	7.7
	Quebec	20.6	37.5	58.1
New York	Ontario	.4	30.3	30.7
	Quebec	44.2	29.8	74.0
Ohio	Indiana	.1	2.7	2.8
	Tennessee	—	.1	.1
	Virginia	—	1.9	1.9
Pennsylvania	Ontario	18.4	—	18.4
	Virginia	14.7	3.0	17.7
Vermont	Quebec	9.1	—	9.1
All states		386.5	196.2	582.7

[1] States with no receipts are omitted.

Table 8.—Pulpwood chip receipts from wood-using plants outside the Northeast, by states (or provinces) of origin and species groups, 1969

(In thousands of rough cords equivalents)

Receiving state[1]	State (or province) of origin	Total softwood	Total hardwood	All species
Kentucky	Illinois	—	1.1	1.1
	Indiana	—	4.9	4.9
	Missouri	—	1.8	1.8
	Tennessee	—	14.4	14.4
Maine	New Brunswick	14.9	5.1	20.0
	Quebec	13.2	—	13.2
Maryland	Virginia	—	1.3	1.3
New Hampshire	Quebec	29.1	9.8	38.9
New York	Ontario	—	8.4	8.4
	Quebec	—	4.1	4.1
Ohio	Arkansas	.1	—	.1
	Indiana	—	2.0	2.0
	Virginia	—	6.4	6.4
Pennsylvania	Virginia	10.6	1.0	11.6
All states		67.9	60.3	128.2

[1] States with no receipts are omitted.

Table 9.—Pulpwood production from roundwood in the Northeast, by states and species groups, 1969

(In thousands of rough cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods[1]	Total	
Connecticut	—	—	6.7	6.7	—	2.8	4.3	7.1	13.8
Delaware	—	—	76.3	76.3	—	.4	1.5	1.9	78.2
Kentucky	(*)	(*)	27.5	27.5	0.4	46.0	9.7	56.1	83.6
Maine	1,509.3	233.6	147.4	1,890.3	23.7	47.9	706.3	777.9	2,668.2
Maryland	.3	.7	130.6	131.6	7.7	65.5	9.6	82.8	214.4
Massachussetts	—	—	13.0	13.0	—	2.2	3.9	6.1	19.1
New Hampshire	68.8	8.3	4.1	81.2	18.0	—	129.3	147.3	228.5
New Jersey	—	—	21.6	21.6	4.6	—	3.0	7.6	29.2
New York	61.7	7.2	32.3	101.2	10.8	9.1	244.1	264.0	365.2
Ohio	.6	.6	11.0	12.2	2.4	205.3	11.0	218.7	230.9
Pennsylvania	.1	6.0	53.1	59.2	64.6	166.9	331.2	562.7	621.9
Rhode Island	—	—	4.6	4.6	—	2.2	.9	3.1	7.7
Vermont	55.9	2.1	3.7	61.7	6.8	(*)	38.7	45.5	107.2
West Virginia	9.7	6.4	62.5	78.6	33.0	150.7	17.4	201.1	279.7
All states	1,706.4	264.9	594.4	2,565.7	172.0	699.0	1,510.9	2,381.9	4,947.6

[1] Chiefly maple, beech, gums, elms, and birch species.
* Less than 50 cords.

Table 10.—Pulpwood production from roundwood in Southern New England, by states and counties and species groups, 1969

(In thousands of rough cords)

State and county[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Connecticut:	—	—	6.7	6.7	—	2.8	4.3	7.1	13.8
Hartford	—	—	2.9	2.9	—	—	—	—	2.9
New Haven	—	—	.5	.5	—	--	—	—	.5
New London	—	—	.8	.8	—	.4	2.7	3.1	3.9
Tolland	—	—	.4	.4	—	.2	—	.2	.6
Windham	—	—	2.1	2.1	—	2.2	1.6	3.8	5.9
Massachusetts:	—	—	13.0	13.0	—	2.2	3.9	6.1	19.1
Barnstable	—	—	.2	.2	—	—	—	—	.2
Berkshire	—	—	—	—	—	(*)	.4	.4	.4
Bristol	—	—	3.0	3.0	—	.6	.6	1.2	4.2
Essex	—	—	—	—	—	—	1.0	1.0	1.0
Franklin	—	—	—	—	—	—	(*)	(*)	(*)
Plymouth	—	—	9.6	9.6	—	1.6	1.9	3.5	13.1
Worcester	—	—	.2	.2	—	—	(*)	(*)	.2
Rhode Island:	—	—	4.6	4.6	—	2.2	.9	3.1	7.7
Kent	—	—	1.5	1.5	—	1.4	.4	1.8	3.3
Providence	—	—	2.5	2.5	—	.5	.2	.7	3.2
Washington	—	—	.6	.6	—	.3	.3	.6	1.2

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 11.—Pulpwood production from roundwood in Delaware and New Jersey, by states and counties and species groups, 1969

(In thousands of rough cords)

State and county[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Delaware:	—	—	76.3	76.3	—	0.4	1.5	1.9	78.2
Kent	—	—	1.2	1.2	—	—	(*)	(*)	1.2
Sussex	—	—	75.1	75.1	—	.4	1.5	1.9	77.0
New Jersey:	—	—	21.6	21.6	4.6	—	3.0	7.6	29.2
Atlantic	—	—	5.3	5.3	—	—	.3	.3	5.6
Burlington	—	—	5.3	5.3	2.3	—	1.3	3.6	8.9
Camden	—	—	5.3	5.3	.8	—	.6	1.4	6.7
Cape May	—	—	.8	.8	—	—	.1	.1	.9
Gloucester	—	—	—	—	1.5	—	.7	2.2	2.2
Ocean	—	—	4.9	4.9	—	—	—	—	4.9
Warren	—	—	—	—	(*)	—	(*)	(*)	(*)

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 12.—Pulpwood production from roundwood in Kentucky, by counties and species groups, 1969

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Ballard	—	—	—	—	—	0.6	0.3	0.9	0.9
Bath	(*)	(*)	1.6	1.6	0.4	.9	.2	1.5	3.1
Boyd	(*)	(*)	.1	.1	—	—	—	—	.1
Breckinridge	—	—	—	—	—	.8	.4	1.2	1.2
Carroll	—	—	—	—	—	.4	.2	.6	.6
Carter	(*)	(*)	.1	.1	—	2.8	—	2.8	2.9
Christian	—	—	—	—	—	.2	(*)	.2	.2
Clay	—	—	—	—	—	.2	.1	.3	.3
Daviess	—	—	—	—	—	.5	.2	.7	.7
Elliott	—	—	—	—	—	.2	—	.2	.2
Graves	—	—	—	—	—	.1	.1	.2	.2
Greenup	—	—	—	—	—	13.5	—	13.5	13.5
Hancock	—	—	—	—	—	1.1	.5	1.6	1.6
Harlan	—	—	4.8	4.8	—	—	—	—	4.8
Hopkins	—	—	—	—	—	1.1	.6	1.7	1.7
Johnson	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Laurel	—	—	5.7	5.7	—	3.6	1.5	5.1	10.8
Lawrence	—	—	.1	.1	—	.5	—	.5	.6
Lewis	—	—	(*)	(*)	—	6.1	—	6.1	6.1
Lincoln	—	—	.5	.5	—	1.8	.5	2.3	2.8
McCracken	—	—	—	—	—	.1	.1	.2	.2
McCreary	—	—	5.3	5.3	—	2.8	1.9	4.7	10.0
Muhlenberg	—	—	—	—	—	1.3	.6	1.9	1.9
Ohio	—	—	—	—	—	.8	.4	1.2	1.2
Pulaski	—	—	.8	.8	—	—	—	—	.8
Rowan	—	—	—	—	—	1.2	—	1.2	1.2
Wayne	—	—	1.5	1.5	—	—	—	—	1.5
Whitley	—	—	7.0	7.0	—	5.4	2.1	7.5	14.5
Total	(*)	(*)	27.5	27.5	0.4	46.0	9.7	56.1	83.6

[1] Counties with no production are omitted.

* Less than 50 cords.

Table 13.—Pulpwood production from roundwood in Maine, by counties and species groups, 1969

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Androscoggin	2.7	4.0	17.8	24.5	(*)	5.8	8.4	14.2	38.7
Aroostook	433.4	16.9	—	450.3	15.3	—	56.9	72.2	522.5
Cumberland	3.3	3.6	17.5	24.4	(*)	5.8	26.2	32.0	56.4
Franklin	46.6	6.5	5.0	58.1	—	4.2	61.2	65.4	123.5
Hancock	40.6	5.7	3.3	49.6	.4	2.0	13.1	15.5	65.1
Kennebec	5.3	8.5	18.6	32.4	—	2.8	27.0	29.8	62.2
Knox	12.8	2.9	4.3	20.0	—	1.8	6.6	8.4	28.4
Lincoln	12.3	5.2	13.3	30.8	(*)	1.8	15.0	16.8	47.6
Oxford	43.3	19.2	20.9	83.4	.6	6.8	123.4	130.8	214.2
Penobscot	173.3	65.4	2.3	241.0	3.7	—	145.9	149.6	390.6
Piscataquis	245.6	16.6	4.7	266.9	2.6	1.7	44.7	49.0	315.9
Sagadahoc	1.9	1.4	5.2	8.5	.1	2.0	2.6	4.7	13.2
Somerset	294.9	13.4	6.2	314.5	.3	—	70.8	71.1	385.6
Waldo	16.8	9.7	8.8	35.3	(*)	2.8	17.5	20.3	55.6
Washington	176.2	53.7	14.0	243.9	.7	4.6	73.6	78.9	322.8
York	.3	.9	5.5	6.7	(*)	5.8	13.4	19.2	25.9
Total	1,509.3	233.6	147.4	1,890.3	23.7	47.9	706.3	777.9	2,668.2

* Less than 50 cords.

Table 14.—Pulpwood production from roundwood in Maryland, by counties and species groups, 1969

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Allegany	0.2	0.4	3.3	3.9	3.3	26.8	2.2	32.3	36.2
Anne Arundel	—	—	2.6	2.6	—	(*)	(*)	(*)	2.6
Baltimore	—	—	.1	.1	—	.1	(*)	.1	.2
Calvert	(*)	.1	3.3	3.4	(*)	(*)	(*)	(*)	3.4
Caroline	—	—	5.0	5.0	—	—	.1	.1	5.1
Carroll	—	—	(*)	(*)	—	.3	.2	.5	.5
Cecil	—	—	(*)	(*)	—	3.3	3.1	6.4	6.4
Charles	—	—	7.7	7.7	—	.3	.4	.7	8.4
Dorchester	—	—	22.8	22.8	—	.3	.1	.4	23.2
Frederick	—	—	—	—	—	.3	.1	.4	.4
Garrett	.1	.2	1.9	2.2	4.4	31.7	2.3	38.4	40.6
Harford	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Howard	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Kent	—	—	.3	.3	—	—	—	—	.3
Montgomery	(*)	(*)	(*)	(*)	—	(*)	—	(*)	(*)
Prince Georges	—	—	1.9	1.9	—	(*)	—	(*)	1.9
Queen Annes	—	—	(*)	(*)	—	—	—	—	(*)
Somerset	—	—	10.1	10.1	—	—	—	—	10.1
Talbot	—	—	(*)	(*)	—	—	(*)	(*)	(*)
Washington	(*)	(*)	1.4	1.4	(*)	2.0	1.0	3.0	4.4
Wicomico	—	—	31.1	31.1	(*)	.2	.1	.3	31.4
Worcester	—	—	39.1	39.1	—	.2	—	.2	39.3
Total	0.3	0.7	130.6	131.6	7.7	65.5	9.6	82.8	214.4

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 15.—Pulpwood production from roundwood in New Hampshire, by counties and species group, 1969

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Belknap	0.1	(*)	(*)	0.1	—	—	—	—	0.1
Carroll	.6	0.6	0.8	2.0	(*)	—	4.4	4.4	6.4
Cheshire	(*)	(*)	(*)	(*)	—	—	(*)	(*)	(*)
Coos	61.7	4.6	1.7	68.0	18.0	—	117.8	135.8	203.8
Grafton	6.2	2.7	1.0	9.9	(*)	—	3.1	3.1	13.0
Hillsboro	.2	.4	.6	1.2	—	—	.1	.1	1.3
Merrimack	—	(*)	(*)	(*)	—	—	.9	.9	.9
Strafford	—	—	(*)	(*)	—	—	3.0	3.0	3.0
Sullivan	(*)	—	—	(*)	—	—	—	—	(*)
Total	68.8	8.3	4.1	81.2	18.0	—	129.3	147.3	228.5

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 16.—Pulpwood production from roundwood in New York, by counties and species groups, 1969

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	—	—	—	—	—	0.1	0.3	0.4	0.4
Allegany	—	—	—	—	(*)	—	.5	.5	.5
Broome	—	—	—	—	0.1	.2	2.7	3.0	3.0
Cattaraugus	—	—	—	—	—	—	2.4	2.4	2.4
Cayuga	—	—	—	—	.1	—	.9	1.0	1.0
Chautauqua	—	—	—	—	.1	—	.2	.3	.3
Chemung	—	—	0.1	0.1	.1	.2	.6	.9	1.0
Chenango	0.3	—	2.3	2.6	—	.4	3.1	3.5	6.1
Clinton	4.0	1.0	.5	5.5	1.6	—	22.4	24.0	29.5
Columbia	—	—	—	—	—	(*)	(*)	(*)	(*)
Cortland	—	(*)	1.0	1.0	(*)	—	(*)	(*)	1.0
Delaware	.5	—	.4	.9	(*)	.4	3.2	3.6	4.5
Erie	—	—	—	—	.6	—	.5	1.1	1.1
Essex	3.1	(*)	.7	3.8	.8	—	33.7	34.5	38.3
Franklin	10.3	1.1	1.3	12.7	.8	.1	6.8	7.7	20.4
Fulton	1.2	(*)	—	1.2	.3	1.4	16.6	18.3	19.5
Genesee	—	—	—	—	—	—	.1	.1	.1
Greene	—	—	—	—	—	.1	.1	.2	.2
Hamilton	8.4	.4	—	8.8	.4	.6	29.5	30.5	39.3
Herkimer	3.1	.1	.2	3.4	(*)	(*)	1.0	1.0	4.4

Jefferson	(*)	.1	2.2	2.3	(*)	—	1.8	1.8	4.1
Lewis	3.0	1.1	1.9	6.0	.6	—	14.9	15.5	21.5
Livingston	—	—	—	—	—	—	(*)	(*)	(*)
Montgomery	(*)	.1	.1	.2	—	.2	1.2	1.4	1.6
Niagara	—	—	—	—	—	—	.3	.3	.3
Onondaga	.7	.5	3.7	4.9	(*)	—	5.3	5.3	10.2
Ontario	(*)	(*)	.6	.6	—	—	.1	.1	.7
Orleans	—	—	—	—	—	—	.4	.4	.4
Oswego	.1	.3	1.4	1.8	—	—	4.3	4.3	6.1
Otsego	.1	(*)	6.1	6.2	(*)	—	.4	.4	6.6
Rensselaer	—	—	—	—	—	1.0	6.0	7.0	7.0
St. Lawrence	24.7	2.5	5.0	32.2	1.6	—	11.5	13.1	45.3
Saratoga	.1	(*)	4.0	4.1	.9	1.1	22.0	24.0	28.1
Schenectady	—	—	—	—	—	(*)	.3	.3	.3
Schoharie	(*)	—	.1	.1	(*)	.2	1.3	1.5	1.6
Schuyler	—	—	—	—	—	—	(*)	(*)	(*)
Steuben	—	—	—	—	.6	—	—	.6	.6
Sullivan	—	—	—	—	—	—	.1	.1	.1
Tioga	—	—	(*)	(*)	.1	.2	.4	.7	.7
Ulster	—	—	—	—	—	(*)	.3	.3	.3
Warren	2.0	—	.7	2.7	.7	1.3	25.2	27.2	29.9
Washington	.1	—	—	.1	.8	1.6	23.1	25.5	25.6
Wyoming	—	—	—	—	.6	—	.4	1.0	1.0
Yates	—	—	—	—	—	—	.2	.2	.2
Total	61.7	7.2	32.3	101.2	10.8	9.1	244.1	264.0	365.2

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 17.—Pulpwood production from roundwood in Ohio, by counties and species groups, 1969

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	(*)	(*)	—	6.8	—	6.8	6.8
Ashland	—	—	—	—	—	1.2	0.8	2.0	2.0
Ashtabula	—	—	—	—	—	—	.1	.1	.1
Athens	—	—	—	—	0.1	1.4	(*)	1.5	1.5
Belmont	—	—	(*)	(*)	—	—	(*)	(*)	(*)
Brown	—	—	(*)	(*)	.1	.4	.2	.7	.7
Butler	—	—	(*)	(*)	.1	.4	.5	1.0	1.0
Carroll	—	—	—	—	—	.5	.1	.6	.6
Clermont	—	—	(*)	(*)	(*)	.2	.3	.5	.5
Clinton	—	—	0.1	0.1	.8	.2	1.1	2.1	2.2
Coshocton	—	—	—	—	—	12.0	.6	12.6	12.6
Crawford	—	—	—	—	—	—	(*)	(*)	(*)
Delaware	—	—	—	—	—	(*)	—	(*)	(*)
Erie	—	—	—	—	—	.5	.7	1.2	1.2
Fairfield	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Gallia	0.3	0.3	6.0	6.6	—	18.2	—	18.2	24.8
Greene	—	—	(*)	(*)	(*)	.1	.2	.3	.3
Guernsey	—	—	—	—	—	8.0	.2	8.2	8.2
Harrison	—	—	—	—	—	.5	(*)	.5	.5
Highland	—	—	(*)	(*)	.1	3.1	.3	3.5	3.5
Hocking	—	—	—	—	.4	3.1	.3	3.8	3.8
Holmes	—	—	—	—	—	1.5	.2	1.7	1.7
Huron	—	—	—	—	—	.9	.9	1.8	1.8
Jackson	.1	.1	.7	.9	—	30.0	—	30.0	30.9

Knox	—	—	—	—	—	3.0	.2	3.2	3.2
Lawrence	.1	.1	1.1	1.3	—	13.7	—	13.7	15.0
Licking	(*)	(*)	(*)	(*)	—	5.0	.2	5.2	5.2
Lorain	—	—	—	—	—	.5	.6	1.1	1.1
Mahoning	(*)	(*)	.6	.6	—	—	—	—	.6
Meigs	.1	.1	1.6	1.8	—	.8	—	.8	2.6
Monroe	—	—	—	—	—	—	(*)	(*)	(*)
Montgomery	—	—	(*)	(*)	.3	.3	.5	1.1	1.1
Morgan	—	—	(*)	(*)	—	—	—	—	(*)
Morrow	—	—	—	—	—	—	.1	.1	.1
Muskingum	—	—	—	—	—	7.0	.5	7.5	7.5
Noble	—	—	—	—	—	.3	—	.3	.3
Perry	—	—	—	—	(*)	1.1	1.0	2.1	2.1
Pickaway	—	—	—	—	(*)	.1	(*)	.1	.1
Pike	—	—	—	—	—	11.8	—	11.8	11.8
Preble	—	—	.1	.1	.1	.2	.3	.6	.7
Richland	—	—	—	—	—	(*)	—	(*)	(*)
Ross	—	—	—	—	(*)	11.3	(*)	11.3	11.3
Sandusky	—	—	—	—	—	(*)	.1	.1	.1
Scioto	(*)	(*)	.1	.1	(*)	39.6	(*)	39.6	39.7
Seneca	—	—	—	—	—	(*)	.1	.1	.1
Stark	—	—	—	—	—	.3	.1	.4	.4
Tuscarawas	—	—	—	—	—	1.5	.4	1.9	1.9
Vinton	(*)	(*)	(*)	(*)	.1	19.5	.1	19.7	19.7
Warren	—	—	.1	.1	.3	.2	.3	.8	.9
Washington	(*)	(*)	.6	.6	—	—	—	—	.6
Wayne	—	—	—	—	—	(*)	(*)	(*)	(*)
Wyandot	—	—	—	—	—	.1	—	.1	.1
Total	0.6	0.6	11.0	12.2	2.4	205.3	11.0	218.7	230.9

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 18.—Pulpwood production from roundwood in Pennsylvania, by counties and species groups, 1969

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	1.0	1.0	—	4.5	2.3	6.8	7.8
Armstrong	—	—	—	—	—	—	(*)	(*)	(*)
Bedford	—	0.3	6.4	6.7	6.9	18.7	7.5	33.1	39.8
Berks	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Blair	—	(*)	.9	.9	.3	2.5	7.9	10.7	11.6
Bradford	0.1	—	—	.1	5.5	.4	21.9	27.8	27.9
Butler	—	—	—	—	—	—	.3	.3	.3
Cambria	—	—	1.6	1.6	1.4	3.1	1.9	6.4	8.0
Cameron	—	(*)	.1	.1	2.6	1.8	11.2	15.6	15.7
Carbon	—	—	.1	.1	—	.2	.2	.4	.5
Centre	—	.8	2.5	3.3	6.2	12.5	20.5	39.2	42.5
Chester	—	—	—	—	—	(*)	—	(*)	(*)
Clarion	—	(*)	(*)	(*)	—	—	2.1	2.1	2.1
Clearfield	—	1.7	5.0	6.7	7.5	6.3	26.6	40.4	47.1
Clinton	—	.1	.6	.7	1.2	10.2	2.9	14.3	15.0
Columbia	—	—	.2	.2	—	2.2	.6	2.8	3.0
Crawford	—	—	—	—	—	—	5.7	5.7	5.7
Cumberland	—	—	.7	.7	—	5.5	2.5	8.0	8.7
Dauphin	—	—	1.	.1	—	1.2	.5	1.7	1.8
Elk	—	.2	.4	.6	5.3	4.0	17.1	26.4	27.0
Erie	—	—	(*)	(*)	—	(*)	3.4	3.4	3.4
Fayette	(*)	(*)	(*)	(*)	.7	1.4	3.7	5.8	5.8
Forest	—	(*)	.1	.1	.1	.1	16.3	16.5	16.6
Franklin	—	(*)	2.9	2.9	.1	10.1	4.4	14.6	17.5
Fulton	—	(*)	4.2	4.2	.2	6.6	D.J	10.8	15.0
Greene	—	(*)	(*)	(*)	—	—	—	—	(*)

Huntingdon	—	1.7	11.2	12.9	8.9	22.0	10.6	41.5	54.4
Indiana	—	(*)	1.6	1.6	.9	1.0	1.6	3.5	5.1
Jefferson	—	.8	2.5	3.3	1.5	1.1	3.6	6.2	9.5
Juniata	—	.1	1.2	1.3	.2	2.3	1.1	3.6	4.9
Lackawanna	—	—	—	—	.1	.1	.2	.4	.4
Lancaster	—	—	.1	.1	—	1.8	.6	2.4	2.5
Lawrence	(*)	(*)	.1	.1	—	—	—	—	.1
Lebanon	—	—	(*)	(*)	—	.9	.4	1.3	1.3
Luzerne	—	—	.2	.2	.1	1.3	1.2	2.6	2.8
Lycoming	—	.1	.4	.5	1.3	16.9	10.0	28.2	28.7
McKean	—	(*)	.2	.2	.2	.1	35.4	35.7	35.9
Mifflin	—	.1	.9	1.0	1.0	1.0	.4	2.4	3.4
Monroe	—	—	(*)	(*)	—	.3	.1	.4	.4
Montour	—	—	.2	.2	—	.3	.3	.6	.8
Northumberland	—	—	.4	.4	—	1.5	.6	2.1	2.5
Perry	—	(*)	1.3	1.3	—	4.2	1.3	5.5	6.8
Potter	—	(*)	(*)	(*)	.7	.4	6.7	7.8	7.8
Schuylkill	—	—	1.0	1.0	—	2.9	1.7	4.6	5.6
Snyder	—	(*)	1.0	1.0	—	1.9	.5	2.4	3.4
Somerset	(*)	.1	.9	1.0	3.1	7.8	4.9	15.8	16.8
Sullivan	—	—	.1	.1	3.8	.2	17.2	21.2	21.3
Susquehanna	—	—	—	—	1.4	.7	12.8	14.9	14.9
Tioga	—	(*)	(*)	(*)	1.4	.5	7.8	9.7	9.7
Union	—	(*)	.3	.3	—	1.9	.6	2.5	2.8
Venango	—	—	—	—	—	—	16.5	16.5	16.5
Warren	—	(*)	.2	.2	.8	.5	16.1	17.4	17.6
Washington	—	(*)	(*)	(*)	—	(*)	—	(*)	(*)
Wayne	—	—	—	—	.6	.3	9.1	10.0	10.0
Westmoreland	(*)	(*)	.1	.1	—	.1	—	.1	.2
Wyoming	—	—	(*)	(*)	.6	.6	5.0	6.2	6.2
York	—	—	2.4	2.4	—	3.0	1.4	4.4	6.8
Total	0.1	6.0	53.1	59.2	64.6	166.9	331.2	562.7	621.9

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 19.—Pulpwood production from roundwood in Vermont, by counties and species groups, 1969

(In thousands of rough cords)

County[1]	Hardwood				Softwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Addison	1.7	—	—	1.7	0.3	—	0.7	1.0	2.7
Bennington	(*)	—	—	(*)	(*)	(*)	6.3	6.3	6.3
Caledonia	7.3	0.7	1.0	9.0	.1	—	2.7	2.8	11.8
Chittenden	.2	—	1.0	1.2	.1	—	1.4	1.5	2.7
Essex	18.5	.1	.5	19.1	4.0	—	14.9	18.9	38.0
Franklin	1.1	.4	(*)	1.5	.1	—	2.5	2.6	4.1
Lamoille	2.6	—	(*)	2.6	(*)	—	.4	.4	3.0
Orange	.2	.1	.2	.5	.1	—	(*)	.1	.6
Orleans	7.9	.8	.6	9.3	1.4	—	1.5	2.9	12.2
Rutland	2.9	—	—	2.9	.2	(*)	3.6	3.8	6.7
Washington	1.7	—	.4	2.1	—	—	1.3	1.3	3.4
Windham	5.8	—	(*)	5.8	.3	—	(*)	.3	6.1
Windsor	6.0	—	—	6.0	.2	—	3.4	3.6	9.6
Total	55.9	2.1	3.7	61.7	6.8	(*)	38.7	45.5	107.2

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 20.—Pulpwood production from roundwood in West Virginia, by counties and species groups, 1969

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Berkeley	—	—	6.2	6.2	—	2.6	0.9	3.5	9.7
Braxton	—	—	(*)	(*)	—	—	—	—	(*)
Cabell	0.1	0.1	.4	.6	(*)	.1	(*)	.1	.7
Calhoun	.1	(*)	.2	.3	—	—	—	—	.3
Doddridge	(*)	(*)	.1	.1	—	(*)	—	(*)	.1
Fayette	—	—	—	—	(*)	.1	—	.1	.1
Gilmer	—	—	(*)	(*)	—	—	—	—	(*)
Grant	1.2	.6	4.3	6.1	4.9	23.2	1.8	29.9	36.0
Greenbrier	(*)	.3	2.1	2.4	5.8	20.3	2.9	29.0	31.4
Hampshire	2.1	1.1	12.1	15.3	4.6	25.3	1.9	31.8	47.1
Hardy	.9	.5	3.3	4.7	2.2	11.4	.9	14.5	19.2
Jackson	.7	.4	2.4	3.5	(*)	.2	(*)	.2	3.7
Kanahwa	—	—	(*)	(*)	—	—	—	—	(*)
Lewis	—	—	—	—	—	(*)	—	(*)	(*)
Lincoln	(*)	(*)	.1	.1	—	(*)	—	(*)	.1
Mason	.6	.3	2.0	2.9	(*)	.1	—	.1	3.0
Mercer	—	—	(*)	(*)	—	—	—	—	(*)
Mineral	.5	.3	1.7	2.5	3.1	16.3	1.2	20.6	23.1
Mingo	—	—	(*)	(*)	—	—	—	—	(*)
Monongalia	—	—	—	—	—	(*)	—	(*)	(*)

CONTINUED

Table 20.—Continued

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Monroe	.1	.7	4.8	5.6	5.4	18.8	2.7	26.9	32.5
Morgan	.5	.3	9.3	10.1	.5	7.6	2.7	10.8	20.9
Nicholas	(*)	(*)	.1	.1	.1	.3	(*)	.4	.5
Pendleton	.2	.1	.6	.9	.7	2.7	.3	3.7	4.6
Pleasants	.2	.1	.8	1.1	—	(*)	—	(*)	1.1
Pocahontas	.1	.4	3.0	3.5	2.7	8.9	1.2	12.8	16.3
Preston	—	—	(*)	(*)	.9	4.1	.2	5.2	5.2
Putnam	.7	.4	2.5	3.6	—	(*)	—	(*)	3.6
Randolph	.1	(*)	.3	.4	.3	1.2	.1	1.6	2.0
Ritchie	.3	.1	.9	1.3	—	—	—	—	1.3
Roane	—	—	(*)	(*)	—	—	—	—	(*)
Summers	(*)	.1	.7	.8	.5	1.7	.2	2.4	3.2
Tucker	(*)	(*)	.1	.1	1.2	4.6	.4	6.2	6.3
Tyler	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Wayne	(*)	(*)	.1	.1	(*)	.1	(*)	.1	.2
Webster	—	—	—	—	(*)	.2	(*)	.2	.2
Wetzel	—	—	—	—	—	(*)	—	(*)	(*)
Wirt	.9	.4	3.1	4.4	.1	.2	(*)	.3	4.7
Wood	.4	.2	1.3	1.9	(*)	.7	(*)	.7	2.6
Total	9.7	6.4	62.5	78.6	33.0	150.7	17.4	201.1	279.7

[1] Counties with no production are omitted.
* Less than 50 cords.

THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

PULPWOOD in the Northeast: PAST PRESENT & FUTURE

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NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
WARREN T. DOOLITTLE, DIRECTOR

FOREWORD

SINCE 1963, the Northeastern Forest Experiment Station has conducted annual canvasses of woodpulp mills in the Northeast to estimate the production of pulpwood in the region. The results of these canvasses are published annually by the Station. These reports are listed in the bibliography.

Cover photographs courtesy of Maine Forestry Department.

PULPWOOD in the Northeast: PAST PRESENT & FUTURE

by Neal P. Kingsley

The Author

NEAL P. KINGSLEY, research forester, received his bachelor's degree in forestry from the University of New Hampshire in 1961 and his master's degree in forest economics from the same university in 1963. He joined the Northeastern Forest Experiment Station in August 1962 and has been stationed since that time in Upper Darby, Pa., where he is a resource analyst in the Station's Forest Survey unit.

MANUSCRIPT RECEIVED FOR PUBLICATION 8 APRIL 1971.

A PROJECTION

THE PAPER INDUSTRY in North America began in the northeastern United States in 1690. From this beginning, the U. S. has become the largest producer—and the largest consumer—of paper in the world. The Northeast is an important part of this industry: in 1969, the Northeast produced over 6 million cords of pulpwood—more than 10% of the Nation's total.

This look at the past and present of the pulpwood industry in the Northeast has enabled us to project future demands for pulpwood and to predict how the Northeast might meet these demands.

Fourteen states comprise the Northeastern region: Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia. In the 1963 and 1964 canvasses, data for Kentucky and Ohio were compiled by the Central States Forest Experiment Station. These data have been combined with the Northeastern Station for these years in this report.

U.S.: WORLD'S BIGGEST PAPER CONSUMER

The United States is by far the largest paper consuming nation in the world. In 1969, U. S. consumption of paper and board stood at 576 pounds per person. Per capita consumption of paper and board in the U. S. has risen steadily since 1920 when per capita consumption stood at 145 pounds. If current trends continue, consumption could conceivably reach 796 pounds by 1985 (fig. 1). A projected population of 255 million in 1985 would use about 101 million tons of paper and board compared to about 58 million tons used in 1969.

About three-fourths of the paper and board manufactured in the U. S. is made from woodpulp. Even with the recent interest in the repulping of fibrous waste materials, it is unlikely that this proportion can be reduced significantly before 1985. The demand for pulpwood will undoubtedly increase substantially over the next 15 years.

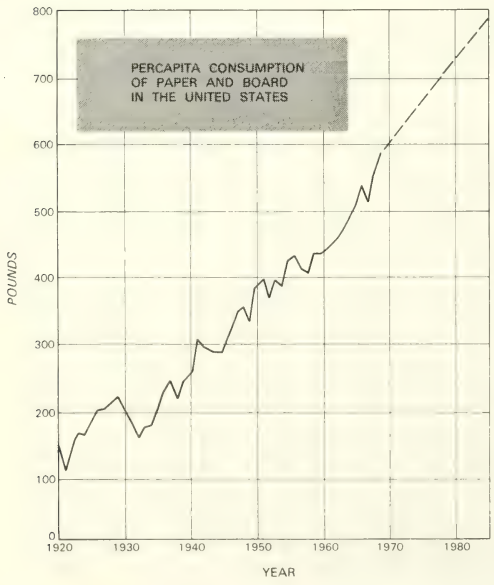
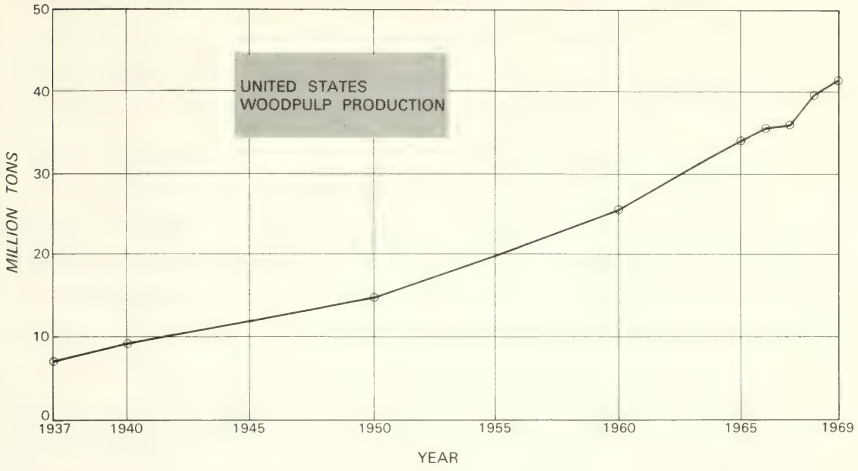


Figure. 1. — Per capita consumption of paper and board in the United States from 1920 to 1969, and projected to 1985.

Figure 2.—U. S. woodpulp production for selected years 1937-1969.



With the world's largest demand for paper and paperboard coupled with an abundant supply of wood, water, technical know-how, and capital, it is no surprise that the United States is the world's leading producer of pulp. In 1969, the U. S. produced 41.6 million tons of pulp (not counting repulped waste paper), or about 36 percent of the world total. U.S. production was 2.2 times that of its nearest rival, Canada, which produced 18 million tons in 1969.

U. S. woodpulp production rose from 6.5 million tons in 1937 to 41.5 million in 1969 (fig. 2). This 1969 production required over 63 million cords of pulpwood. Ninety-nine percent of this was from trees harvested from forests in the U. S.

THE PAST– 1690-1962

The woodpulp and paper industry in the Northeast has a long history of growth and development. The past will bear on the future and, therefore, is worthy of review.

The Northeast is the cradle of the paper and woodpulp industries in America. The Region has to its credit a long list of firsts in these industries.

1690—*First* paper mill in North America, built by William Rittenhouse and William Bradford on Wissahickon Creek near Philadelphia.

1816—*First* paper making machine used by Joshua and Thomas Gilpin at Wilmington, Del.

1855—*First* soda pulpmill in U. S. built at Manayunk, Pa.

1867—*First* groundwood mill in U. S. at Curtisville, Mass.

1871—*First* use of poplar in woodpulp in western Mass.

1882—*First* sulphite mill in U. S. at East Providence, R. I.

1930—*First* use of chipped sawmill slabs and edgings at Madawaska, Me.

The woodpulp industry expanded rapidly in the late 1800's and early 1900's. This is shown dramatically by the following statistics on pulpwood consumption for selected years:

1870—2,000 cords
1880—40,000 cords
1890—580,000 cords
1920—6,000,000 cords

During this period, the Northeast was the center of the U. S. woodpulp industry. From 1904 through 1923, New York was the leading pulpwood producing State in the country, averaging nearly 947 thousand cords per year or 22 percent of the U. S. production. In fact, during this same period, the New England States, together with Pennsylvania and New York, accounted for 64 percent of the U. S. total. New England alone produced 34 percent; Pennsylvania, 8 percent.

The turn of the century witnessed the birth and development of many of the giants in the industry. Notable were the formation of International Paper Company and the Great Northern Paper Company, now a division of Great Northern Nekoosa Corporation. International, now the world's largest manufacturer of paper, was born on January 31, 1898 when 20 independent mills in Maine, New Hampshire, Massachusetts, Vermont, and New York merged. This

amalgamation of companies controlled a million acres of timberland in the U. S. and 1.6 million acres in Canada. At its outset, it accounted for 90 percent of the U. S. production of newsprint. This combination has been described rather fittingly as "the successful merger of the fourdrinier and the countinghouse" (13).

In 1899, the Great Northern Paper Company was founded partly to counter International's hold on the newsprint industry. Great Northern built its mill at what is now Millinocket, Me. This mill was the largest single mill in the Northeast when it was built, and it is still the largest today. Not only did this company construct the largest mill, but it also built the city of Millinocket—"the magic city of the North" (15). When the mill began production, Millinocket had 2,000 inhabitants in a place that was wilderness a few years earlier. Millinocket, although perhaps the most famous, was not the only town built in this rapid expansion of the industry. Others include Chisholm, Rumford, and Livermore Falls in Maine.

Other large paper companies that came into being in the Northeast include Westvaco Corporation—1888—in Maryland, Hammermill Paper Company—1898—in Pennsylvania, Finch Pruyn Company—after 1900—in New York, and St. Croix Paper Company (now St. Croix Division of Georgia-Pacific Company)—after 1900—in Maine.

During the 1930's, a satisfactory method of pulping southern softwoods was developed. This spurred a rapid growth in pulpwood consumption as seen in the following statistics for national pulpwood consumption:

1930—7,195,500 cords
1940—13,724,958 cords
1950—23,627,217 cords
1960—40,485,000 cords

But the pulping of southern softwoods also slowed the growth of the Northeast as the south gained pre-eminence in woodpulp production.

THE RECENT YEARS–1963-1969

The total production of pulpwood in the Northeastern region rose by 34 percent from 4,642,700 cords in 1963 to 6,062,500 cords in 1969 (fig. 3). This increase closely paralleled the national trend. In 1963, total U. S. production amounted to 44.7 million cords. By 1969, it had risen by 41 percent to 63.0 million cords. On the average over the period, the Northeast produced slightly more than 10 percent of the nation's pulpwood.

About 95 percent of the pulpwood received by mills in the Northeast is produced in the region. Of the remaining 5 percent shipped in from outside the region, Canada supplied from 85 to 93 percent, depending on the year. Most of the Canadian wood is spruce and fir from Quebec and New Brunswick. Virginia, Tennessee, and Indiana also ship pulpwood into the Northeast. Virginia supplies nearly all of the U. S.-produced softwood shipped into the region and about half of the hardwood.

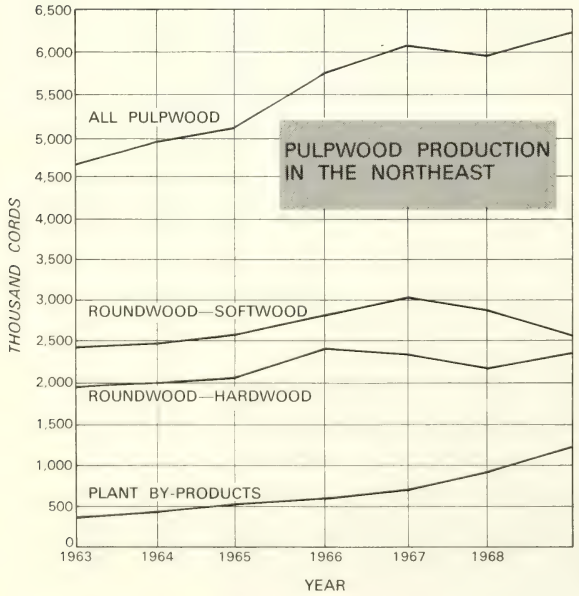


Figure 3.—Pulpwood production in the Northeast by kind of material 1963-1969.

Forms of Wood Used

Pulpwood is produced in two forms—round pulpwood and pulpwood chips. Chips are produced directly from tree stems and from by-products, which are produced principally from waste material from other forest products industries such as sawmill slabs and edgings, veneer cores, and veneer trimmings.

Roundwood accounted for about 87 percent of the pulpwood produced in the Northeast from 1963 through 1969, compared to 77 percent for the nation. However, this proportion has been generally declining as the use of chipped by-products has become more prevalent. In 1963, roundwood accounted for about 93 percent of the production in the Northeast. By 1969, roundwood had declined to 81 percent of the total. Timber industry by-products (mostly chipped slabs and edgings) rose from 7 percent of production in 1963 to 20 percent in 1969.

Species Used

Nearly all commercial species growing in the Northeast are usable as pulpwood. For the purposes of compilation, we have grouped them into three softwood groups and three hardwood groups (fig. 4). Of these groups, spruce-fir is the largest, accounting for about 33 percent of all pulpwood and about 38 percent of the roundwood over the 7-year period (1963 to 1969). However, its share of both the region's roundwood and total pulpwood production has been declining. The second most important species group, other hardwoods, accounted for an average of about 26 percent of the production since 1963. ("Other hardwoods" include all hardwood species found in the Northeast—such as the maples, birches, and beech—except aspen, yellow-poplar, the oaks, and the hickories.) The other-hardwoods group has declined from 28 percent to 24 percent of the total during the 7-year period, but it has held at 30 percent of the roundwood.

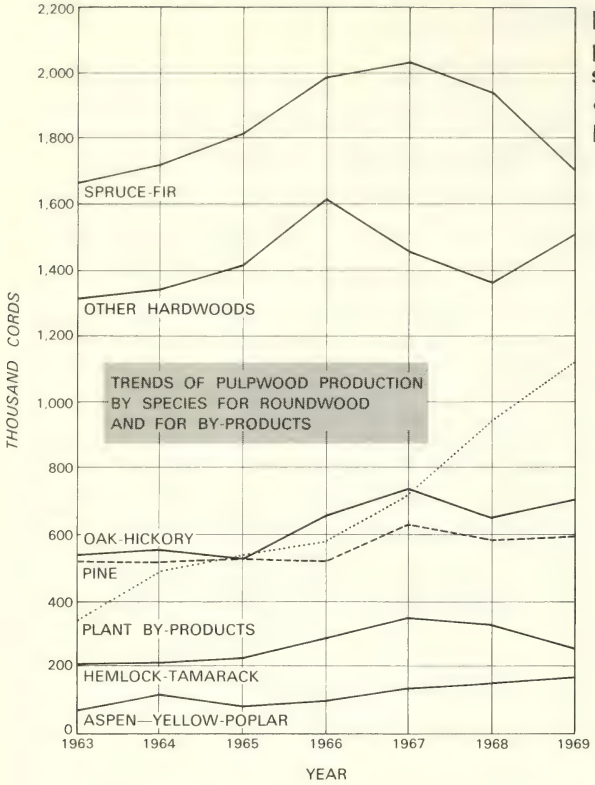


Figure 4.—The trend of pulpwood production by species for roundwood and for wood industry by-products 1963-1969.

Softwood species accounted for about 55 percent of the roundwood production in the Northeast from 1963 through 1969. However, in the nation, they accounted for 72 to 73 percent of the roundwood during the same period. Thus, hardwoods constitute a greater share of production in the Northeast than in the nation. Hardwood roundwood production rose from 44 to 48 percent of the production in the Northeast. For the nation as a whole, it held constant at about 32 percent.

Production by State

Pulpwood is produced in all of the 14 States in the Northeast. Maine is by far the largest producer. Maine's production since 1963 has consistently accounted for about one-half of

the region's total. Pennsylvania, the second largest producer, has accounted for about 13 percent of production.

The States ranked in descending order of production are:

State	*Percent of regional total (1963 to 1969)*
Maine	49
Pennsylvania	13
New York	8
West Virginia	7
Ohio	6
New Hampshire	5
Maryland	5
Vermont	3
Kentucky	2
Delaware	1
New Jersey	1
Massachusetts	Less than 0.5
Connecticut	Less than 0.5
Rhode Island	Less than 0.5

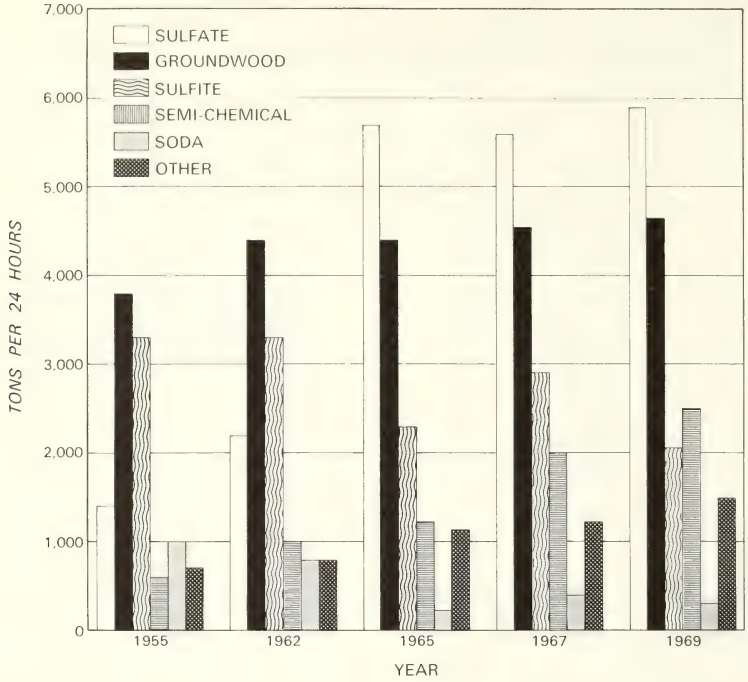
The Woodpulp Mills in the Northeast

In 1969, the Northeast had 64 operating woodpulp mills that had a total estimated daily capacity of 16,676 tons of output. These mills range in capacity from 12 tons to nearly 1,400 tons per day. The average size is about 266 tons per day, and the median size is 180 tons per day. The pulpmills in the Northeast tend to be somewhat smaller than those in the rest of the nation.

Five major woodpulping processes are used in the Northeast—sulfate (Kraft), groundwood, sulfite, semi-chemical, and soda (fig. 5). In addition, many small mills, which primarily supply the building papers and flooring materials industries, use various other processes.

Sulfate.—In 1969, about 35 percent of the Northeast's pulping capacity was in sulfate mills. This process has seen a rapid growth in popularity, rising from 1,400 tons per day (4th place) in 1955 to over 5,900 tons (1st place) in 1969. In general, the sulfate process produces a high quality pulp which can be used to produce quality papers. Sulfate pulp is

Figure 5.—Woodpulp mill capacity in the Northeast, by process for selected years, 1955-1969.



used in the manufacture of such products as bond, book, printing, and business papers as well as in corrugating medium.

With this process it is possible to utilize more of the hardwood species than with the other processes. The increased use of the sulfate process can be seen in the paralleling increase in the use of hardwood species. Consumption of hardwood species increased about 60 percent between 1967 and 1969, while the capacity of sulfate mills in the Northeast gained about 62 percent over the same period.

Groundwood.— The second most prevalent process in the Northeast is the groundwood process, which in 1969 accounted for 27 percent or 4,500 tons per day of the woodpulp capacity in the Northeast. Groundwood pulp production has increased only slightly since 1955, rising from 3,800 tons per

day to 4,650 in 1969. This process had grown moderately, but has lost out to the sulfate process as the leading process in the Northeast. This is reflected by the decreasing proportion of softwood consumed, while the actual volume of softwood consumed has increased.

The groundwood process uses more softwoods than do the other processes. Therefore, most groundwood mills are located in areas with an ample softwood supply. Groundwood woodpulp is used to manufacture such products as tissue and sanitary paper products, newsprint, poster, and other coarser and weaker grades of paper. Groundwood papers are generally lower in value per unit than are most others. Groundwood mills tend to be somewhat larger than other types of mills.

Sulfite.—Sulfite pulp is the third most prominent process accounting for 15 percent of the total daily mill capacity. The capacity of this process has declined in popularity from 3,300 tons per day in 1955 to 2,050 in 1969. Sulfite pulp is suitable for the manufacture of tissue and sanitary papers as well as for bond, ledger, offset, card, and cover papers. The sulfite process uses both softwoods and hardwoods.

Semi-chemical, soda, and miscellaneous processes.—The remaining processes have shown varying trends since 1955. Semi-chemical pulp capacity has increased, primarily as a result of the growing demand for packaging materials. The soda process has declined since 1955 due to the higher relative cost of production. Also, soda pulp, which is used primarily to manufacture book and printing papers, produces short, weak-fibered pulp, which must be combined with other pulps to produce sufficiently strong paper grades.

The other processes, which include the roofing and defibrated wood process, have grown primarily as a result of the growth of the home building industry.

THE FUTURE–1970-1985

What does the future portend for the pulpwood industry in the Northeast? What forms of pulpwood will be produced in the coming years? What sections of the Northeast hold the greatest potential for increased pulpwood production? How will mill closings influence pulpwood's future? What effect might the recycling of fibrous waste have in the next 15 years? We can attempt to provide answers to these questions, and we can give a projection of the future pulpwood production in the Northeast.

What Forms of Pulpwood?

What will be the composition of future pulpwood production? One thing appears certain; we can expect an increase in the proportion of hardwood in the roundwood component. The hardwood proportion of the total pulpwood production has shown a substantial increase nationally. In 1920 it accounted for only 12 percent, and in 1969 it accounted for over 30 percent of the roundwood. Hair, in his publication on projecting demand for paper and board (*7*), projected the hardwood component to rise to 35 percent of the national roundwood output by 1985. In the Northeast, hardwoods have been a major component of roundwood since 1950 when they accounted for 46 percent compared to the 1969 share of 49 percent.

Hardwoods will continue to increase their share of the roundwood output. If we assume present day levels of volume growth for softwoods and hardwoods and compare these with projected total timber cut for softwoods and hardwoods, it becomes evident that shortages of softwood pulpwood can be expected.

In 1967, the estimated average annual net growth of softwood growing stock in the Northeast was 872 million cubic feet and 2,391 million for hardwoods.[1] By 1985, total timber

[1] Office Report, NEFES, 1967, is the most recent year for which net annual growth and removals have been estimated for each state in the Northeast.

removals would be 2.1 billion cubic feet compared with an estimated growth of 3.3 billion, if the following assumptions are made: (1) timber products other than pulpwood continue to follow the trend established during the previous 15 years; (2) that the projected pulpwood production is added to the volume of other products; (3) that the 1985 harvest of round pulpwood is divided between hardwoods and softwoods as was the 1967 harvest, and (4) that no significant increase or decrease in average net annual growth occurs between 1967 and 1985. If these assumptions hold true, about 1.2 billion cubic feet, or 13.5 million cords, of the total timber removals in 1985 would be round pulpwood.

This growth-to-removals ratio looks acceptable, but further examination reveals some potential problems. A comparison of softwood growth and removals shows that growth in 1985 would be about 0.9 billion cubic feet while removals would stand at 0.8 billion. A State by State examination, assuming that the 1985 removals are distributed among the States as were the 1967 removals, shows that four States—Delaware, Maryland, New York, and Ohio—would be harvesting more than they would be growing. And in Maine, the growth of softwoods in 1985 would exceed removals by only 10 percent.

For hardwoods, the estimated 1985 removals would be 1.3 billion cubic feet compared to 2.4 billion feet of growth. Region wide, this is a more favorable ratio than for softwoods. This analysis clearly indicates that in order to continue to grow, the pulpwood industry in the Northeast must utilize an increasing proportion of hardwood in the coming years.

The use of residues from other wood-using industries (plant by-products) as pulpwood has shown outstanding growth in the past 7 years. The most notable growth has been in the development of chipped plant by-products. In 1963, pulpwood chip production accounted for the equivalent of about 325 thousand cords; by 1969 production reached the equivalent of 1,265 thousand cords, most of which, 69 percent, was hardwood.

We do not expect the same growth in the use of chipped residues in the next 15 years as occurred in the preceding 15 years. The reason for this is that lumber production, the principle source of chippable residues, is not expected to keep pace with the growth of the pulpwood industry. Also, the growth in the use of chipped residues has been much greater than the growth of those industries that provide raw material.

Based upon expected growth of the other wood-using industries in the Northeast, a theoretical maximum limit for pulpwood chip production from residues appears to be equivalent to about 2.5 million cords of roundwood. This limit assumes that all suitable material would be chipped for pulpwood. Allowing for other uses of chips such as in metallurgy and agriculture and for unchipped residues, the maximum that might be available for pulpwood would be in the neighborhood of 1.9 million cords. Since present production is 1.2 million cords, it would appear that the practical limit is in sight.

This is not to say pulpwood chips will necessarily decline in relative importance as a raw material. Remote stationary chipping plants that chip roundwood before shipment to the consuming mill have already been established in the Northeast. Portable chippers are being explored and developed. Remote chipping of roundwood offers many advantages in terms of handling and shipping costs. Also, some sawmills that have chippers debark and chip low grade sawlogs, tops, and even large limbs, though the economics of such practices are not well established. These developments presage changes in the handling of raw material rather than an expansion in the use of residue.

In 1969, pulpmills in the Northeast began using sawdust in woodpulp manufacture. Although sawdust has been used successfully as a raw material for a number of years in the Northwest, it is too soon to assess its future in the Northeast. However, it would not appear to have a future comparable to chips. There are two important reasons for this. First, because the sawmill industry is not as large as in other regions,

sawdust is not as abundant. Secondly, sawdust seems to be a natural raw material for such possible future products as pressed or molded wood products.

Growth Areas

Although the future growth of the pulpwood industry in the Northeast can be expected to be fairly well distributed throughout the heavily forested sections of the region, certain areas show a greater potential for growth than do others. The analysis of growth and removals discussed earlier shows that three States stand out as having particularly favorable ratios of growth and removal. These States —Pennsylvania, West Virginia, and Kentucky—each have large volumes of timber; and, by 1985, growth in these States would still be 1½ to 2¼ times the removals.

In addition to a large lightly tapped hardwood resource, these States have the advantage of being fairly close to the major population centers of the East. This area does not now appear to be endowed with many suitable mill sites, primarily because of a lack of adequate water sources and because the mountainous terrain makes harvesting and transporting pulpwood more expensive than in other parts of the region. Technological developments in water recycling (stimulated primarily by pollution control requirements) may make many presently unacceptable sites economically and socially feasible. Also, as demand for paper and competition for timber increase, paper manufacturers may accept the higher costs of harvesting and transportation in order to obtain a sustainable supply of wood.

Several States would have better growth-to-removals ratios in 1985 than Pennsylvania, West Virginia, and Kentucky; but two considerations work against these States as potential future suppliers of large volumes of wood. These States— Connecticut, Massachusetts, New Jersey, and Rhode Island —are all small and heavily populated. The primary purpose of forest land in this region in the years to come will be

recreation and esthetics. It would be unrealistic to look at these States as a sustained source of pulpwood.

Mill Closings?

The pulpmills in the Northeast are, on the average, smaller and older than those in other sections of the nation. Thus, from the standpoint of physical plant, the Northeast is not in a strong competitive position. Over the next few years, we can expect more mill closings and shutdowns as more and more of the region's older mills become too costly to operate profitably. The recent public demand for clean air and water may also add to the problem, as the necessary pollution control devices add appreciably to the cost of operations. While these closings have had, and will continue to have, serious economic implications in the areas in which they occur, the total effect is expected to be short lived, and these temporary losses will be replaced by larger, more profitable, and more stable mills.

The regionwide effects of mill closings over the past 15 years have been more than offset by new pulpmill installations. In 1955, the Northeast had an estimated daily capacity of 10,800 tons of woodpulp per day compared with 16,900 tons in 1969. Thus, capacity rose despite a decrease in the number of pulpmills from 109 in 1955 to 74 in 1969. This, simply stated, means that small, old, unprofitable mills closed and their capacity was replaced by larger, new mills. We can look forward to a continuation of this trend.

Recycling?

About 20 percent of the paper produced in the U. S. is recycled (*16*). Some authorities have predicted that it will be necessary to recycle 25 to 30 percent by 1980 just to meet the demand for paper (*16*).

The question appears to be, will the recycling of waste paper be sufficiently widespread by 1985 to reduce the demand for pulpwood to a measurable degree? Many factors

indicate that it will not be. At the present time, waste pulps are more expensive, in many instances, than are new woodpulps because waste paper fibers cannot be collected, transported, and processed more economically than new wood fibers (*17*). Another limiting factor is consumer preference for products made from new woodpulps because of price advantage, quality, functionality, or appearance.

Few paper products are made entirely from waste pulps. Most of the waste paper pulps are mixed with new woodpulps. This creates a problem because the largest source of waste paper for recycling is in and around major population centers. Most woodpulp mills are located in remote forested regions. Because most modern papermills are integrated with woodpulp mills, waste paper or pulps must be shipped from the populated areas to the papermill. This transportation problem adds appreciably to the cost of using waste paper pulps.

Van der Eb (*17*) lists four factors which will determine how rapidly the use of recycled fibers will develop:

- How quickly the economics turn in its favor,
- How heavily the industry invests in the new and efficient production equipment which is now available,
- How extensively environmental concern encourages the acceptance of recycled products,
- And how fast substantially new products and new markets can be developed.

It is doubtful the general public is willing to accept goods that cost more as the price for environmental improvement. But, given the emerging concern for environmental problems, there is little doubt that, when the economics of recycling are right, the growth of recycling will be rapid. Because of economic obstacles, we are forced to conclude that recycling probably will not cause a substantial reduction in the demand for pulpwood before 1985.

Fifteen Million Cords in 1985?

Projected demands for pulpwood in the U. S. to 1985 were developed by Dwight Hair (*7*). Hair's national projection for pulpwood in 1985 is 118.7 million cords, 100.7 million cords of which is roundwood. These projections have been used here as a basis for arriving at an assessment of the 1985 production of pulpwood in the Northeast.

In recent years, the Northeast has produced slightly more than 10 percent of the nation's pulpwood. If we apply 10 percent to Hair's projection this would indicate that in 1985 the Northeast can be expected to produce about 12 million cords. This would mean nearly doubling production in the next 15 years. Historical precedent for such growth has been established. From 1950 to 1965, roundwood pulpwood production in the Northeast rose from 2.5 million to 4.6 million cords, an 84 percent increase. Were it not for the fact that chipped residues as a source of pulpwood rose from a negligible volume in 1950 to more than 10 percent of the 1965 total, the increase would have been about 104 percent. There is no reason to believe that the Northeast is not capable of similar performance in the next 15 years.

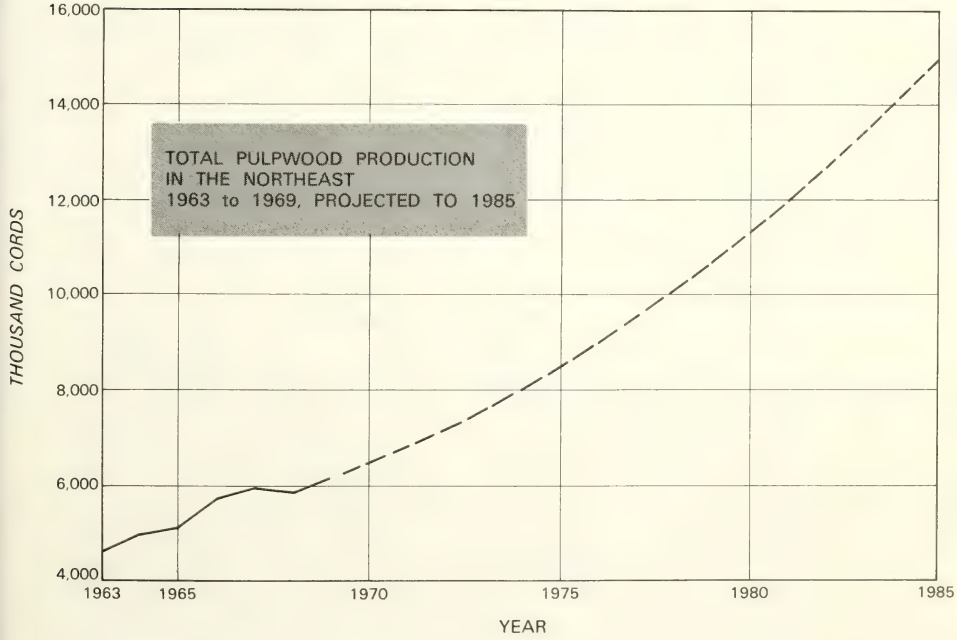
On the contrary, there is considerable evidence to indicate an even greater growth in the next 15-year period. If we compare Hair's projection of national pulpwood production and anticipated demands for other forest products with projected allowable cuts and growth rates shown in "Timber Trends in the United States" (*16*), it becomes evident that critical shortages of wood are likely to develop in the South. This assumes that each producing region will produce the same relative share of the various forest products (lumber, veneer and plywood, pulpwood, and miscellaneous other products) in 1985 as in 1970. Because pulpwood is one of the lower valued forest products, on a unit basis, the demand for sawlogs, veneer logs, turnery bolts, and other higher valued products will take precedence over the demand for pulpwood.

One region that is still likely to have a surplus of wood, under this analysis, is the Northeast. Therefore, it appears

reasonable to conclude that some of the southern deficit will be met by shifting production into the Northeast.

However, it is not reasonable to conclude that all of the deficit will be met by shifting production. Much of the shortage will undoubtedly be met through stepped up forest management, particularly on the more productive sites in the South, and through a higher level of woods utilization. Substantial volumes of usable cellulose are left in the woods in the form of limbs, tops, and uncut rough trees. Economical means will likely be found to utilize this material. The development of these techniques awaits only the added stimulus of an increased demand. With these considerations in mind, the 12 million cord projection derived from Hair's work appears to be too conservative. Pulpwood production in the Northeast will probably reach, and may even exceed, 15 million cords in 1985 (fig. 6).

Figure 6.—Total pulpwood production in the Northeast 1963-1969, and projected to 1985.



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THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

PULPWOOD PRODUCTION in the Northeast 1970

by James T. Bones
and David R. Dickson

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BACKGROUND

THIS ANNUAL REPORT is based on a canvass of all pulpmills in the Northeast that use wood—either roundwood or plant residues—as a basic raw material for a variety of products. Mills that use pulpwood as a raw material in producing insulation board and hardboard were also included in the canvass.

The statistics for production from roundwood reported in this bulletin are based upon mill receipts, which are subject to fluctuations caused by uneven wood-inventory buildups or liquidations from year to year. The plant residues are received at the pulpmill mostly in chip form; however, some coarse residues are being chipped at the mill site. Origins of mill receipts of pulpwood from roundwood are reported by county where cut. However, pulpwood from plant residues can be traced only to the State where it was produced; some of the logs from which the residues came were probably cut in States other than the one in which they were processed.

1970 in Retrospect

The tradeoff has begun. During 1970, International Paper Company closed its 88-year-old pulpmill at Ticonderoga, N. Y., and replaced it with a $76 million mill complex. Westvaco closed its Williamsburg, Pa., mill and is phasing out operations at Mechanicville, N. Y., and Tyrone, Pa. But the Company's new highly automated installation at Wickliffe, Ky., will offset the loss in pulping capacity.

The pulp industry seems to be attacking its major problems—pollution and raw material availability—from three directions. Those companies that have become deeply involved in the battle to curb pollution now realize that one means of fighting water pollution is to develop techniques for obtaining higher pulp yields. The benefits are twofold—fewer pollutants to handle as residue of the pulping process and more product per unit of raw material.

Other companies acknowledge that their primary product —paper—becomes a source of pollution after it is used, since it is disposable. These companies are moving rapidly into the business of recycling waste. Twenty percent of the paper produced annually in the United States today is from recycled waste paper, in contrast to 35 percent in Europe. Current industry recycling ranges from de-inking and recycling newsprint to pilot plants that process garbage, transforming the recovered fibrous stock back into pulp.

A third group of companies are investigating the possibilities of making pulp from non-wood fibers or chemicals. Producing pulp by using raw material from an annually planted and harvested crop has great appeal. In theory, this practice would result in decreased demand for pulpwood and would allow more young trees time to mature and develop into trees of sawlog and veneer-log size.

Crown Zellerbach has developed a process for making synthetic woodpulp from ethylene gas. Although the process cannot yet compete in cost with manufacturing pulp from virgin wood fibers in the United States, it may soon be tested during a joint venture in timber-starved Japan.

After 7 years of collecting pulpwood production statistics in the Northeast, Neal Kingsley has used these statistics as a base for projecting future pulpwood requirements. If you have not yet received your copy of USDA Forest Service Resource Bulletin NE-23, "Pulpwood in the Northeast: Past, Present, and Future," send for one.

Pulpwood Production Climbs

Pulpwood production in the Northeast climbed to record levels in 1970, increasing nearly 10 percent above the 6,068,400 cords reported in 1969. This new record of 6,649,500 cords was attained in response to increases in the pulping capacity of existing mills, rather than new mill openings. Most of the increases from new mills were offset by closing older mills. Increased production of hardwood chips from plant residues in the Station's 14-State territory

(Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia) also contributed to the increase.

Roundwood production from softwood trees recovered much of the ground it lost in the past 2 years, but softwood chip production from plant residues turned down after recovering last year (figure 1). Hardwood pulpwood production from both roundwood and plant residues continued to climb. Hardwoods accounted for nearly 51 percent of the 1970 total.

Receipts of pulpwood at Northeastern woodpulp mills totaled 7,065,400 cords in 1970. Softwood receipts exceeded

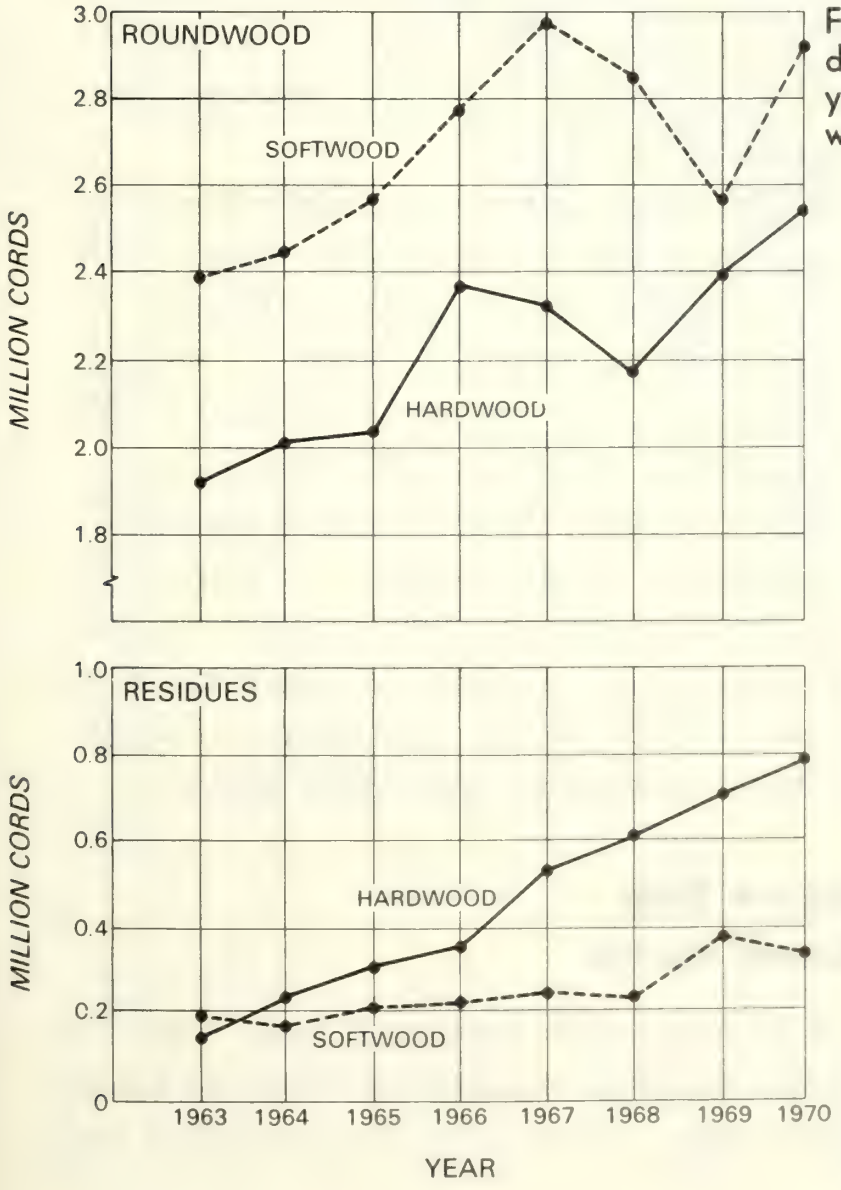


Figure 1.—Pulpwood production for all States, by years and sources of wood.

those of hardwoods by 96,000 cords. Total receipts exceeded total production by 415,900 cords (table 2). Five of the 14 States (Connecticut, Delaware, Massachusetts, Vermont, and West Virginia) produced more wood than they received. Delaware and West Virginia had no operating woodpulp mills; Vermont, Massachusetts, and Connecticut each had one.

Production and receipts of hardwood pulpwood continue to be more or less in balance, while the deficit of softwood pulpwood is made up by Canadian pulpwood shipments into the Northeastern States.

Production from Roundwood Increases

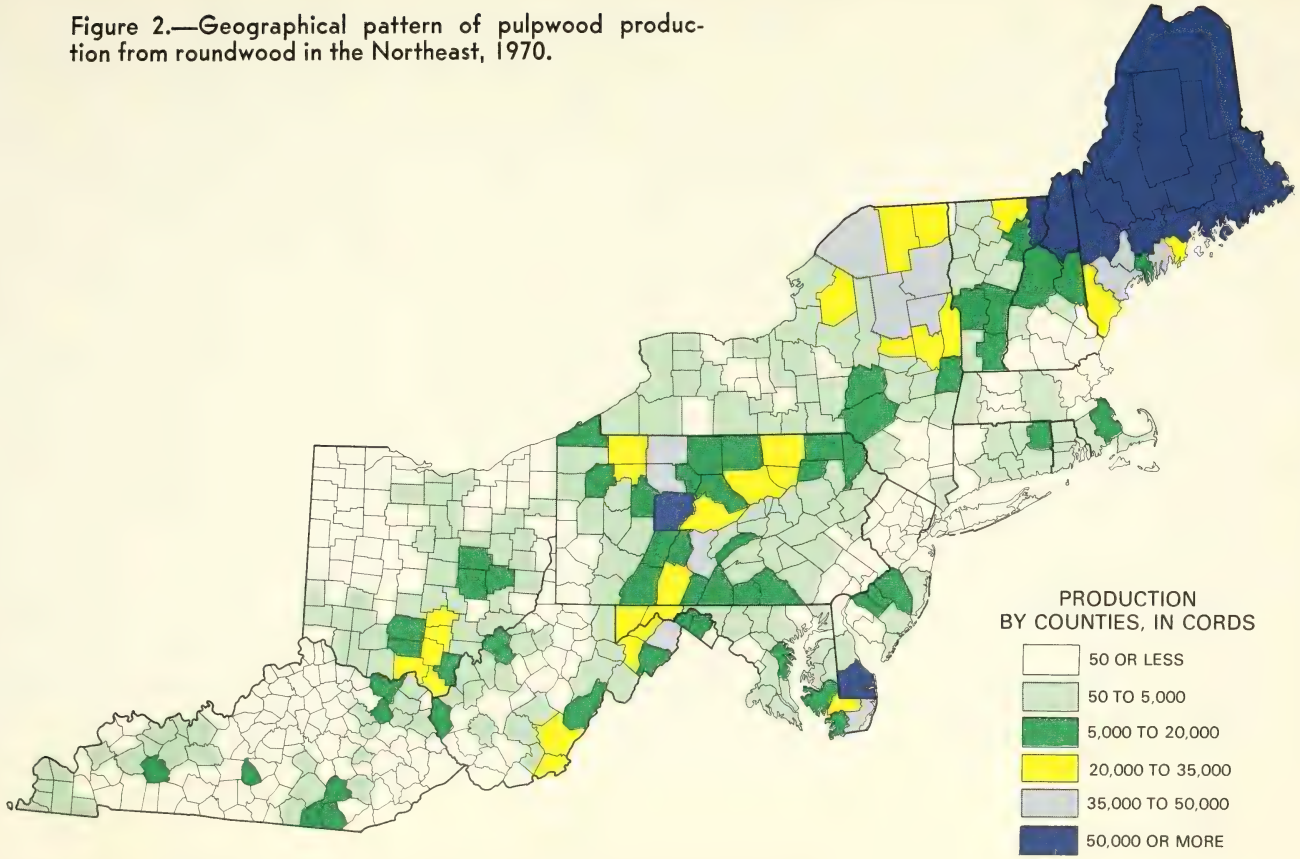
The production of pulpwood from roundwood increased 554,300 cords—11 percent above that of 1969. The 5,501,900 cords of roundwood produced in 1970 tops the previous record of 5,313,300 cords set in 1967.

This year's pulpwood production from roundwood was up from 1969 in six States—Kentucky, Maine, New Jersey, New York, Ohio, and Vermont. Most significant was Maine's 21 percent jump in roundwood production—from 2.7 million cords in 1969 to 3.2 million cords in 1970. Kentucky's 38 percent increase reflected the opening of that State's pulpwood resources through the establishment of new pulpmills. Increases in round pulpwood production in the remaining States reflected higher mill operating levels and increased production capacity. Production declines of more than 10 percent were registered in each of the four States of Delaware, Massachusetts, New Hampshire, and Rhode Island.

Fourteen Counties Top 50-Thousand-Cord Mark

Fourteen counties in five States produced more than 50 thousand cords of pulpwood from roundwood in 1970 (figure 2). This is the same number of counties that reported this

Figure 2.—Geographical pattern of pulpwood production from roundwood in the Northeast, 1970.



record in 1969, but a drop of six counties from the 1967 record level of 20 counties. Clearfield County, Pa., and Essex County, Vt., were restored to the list of high producers after having fallen below the 50-thousand-cord production level in 1969. Cumberland County, Maine, and Huntingdon County, Pa., (both high producers in 1969) were not among the counties producing over 50 thousand cords of pulpwood from roundwood in 1970.

Counties that produced over 50 thousand cords of pulpwood from roundwood in 1970 and their production totals are listed below:

County and State	*Production (thousand cords)*
Aroostook, Me.	706.2
Penobscot, Me.	475.7
Piscataquis, Me.	448.2
Somerset, Me.	370.7
Washington, Me.	360.5
Oxford, Me.	238.7
Franklin, Me.	179.9
Coos, N. H.	179.9
Hancock, Me.	85.8
Waldo, Me.	75.7
Kennebec, Me.	63.1
Sussex, Del.	61.2
Essex, Vt.	59.6
Clearfield, Pa.	52.7

Wood Chip Production Increases

The production of wood chips from plant residues for pulpwood increased 2 percent over the 1,120,800 cord equivalents produced in 1969. A comparison of pulpwood chip production by States between 1969 and 1970 is as follows:

State	1969 (thousand cords)	1970 (thousand cords)	Change (percent)
Connecticut	0.7	0.2	—71
Delaware	1.7	1.5	—12
Kentucky	84.3	124.4	+48
Maine	241.0	248.1	+ 3
Maryland	144.2	116.6	—19
Massachusetts	7.8	11.1	+42
New Hampshire	90.8	105.4	+16
New Jersey	.4	.9	+125
New York	111.6	121.8	+ 9
Ohio	68.5	92.0	+34
Pennsylvania	184.2	170.3	— 8
Rhode Island	1.3	1.5	+15
Vermont	34.9	24.5	—30
West Virginia	149.4	129.3	—13
TOTAL	1,120.8	1,147.6	+ 2

Chip production was up in eight States; New Jersey showed the highest percentage gain (125 percent) while Kentucky showed the highest absolute volume gain (40,100 cord equivalents). The 1970 chips from plant residues production accounted for 17 percent of the Northeastern pulpwood production total, while in 1969 this proportion was 18 percent.

Softwood chip production from plant residues dropped 10 percent between 1969 and 1970, while hardwood chip production rose 9 percent. This year's gain in the production of hardwood chips is the smallest percentage increase registered in the last 5 years. The decline in softwood chip production is the most severe since the 11 percent decline experienced between 1963 and 1964 when only 12 States were included in the Northeastern region.

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Table 1.—Total production of pulpwood in the Northeast, by sources and States, 1970

(In thousands of rough cords)[1]

State	Source		
	From roundwood	From plant residues	From all sources
Connecticut	13.3	0.2	13.5
Delaware	62.3	1.5	63.8
Kentucky	115.2	124.4	239.6
Maine	3,220.9	248.1	3,469.0
Maryland	196.2	116.6	312.8
Massachusetts	14.4	11.1	25.5
New Hampshire	199.1	105.4	304.5
New Jersey	46.5	.9	47.4
New York	388.0	121.8	509.8
Ohio	251.8	92.0	343.8
Pennsylvania	607.1	170.3	777.4
Rhode Island	6.5	1.5	8.0
Vermont	124.8	24.5	149.3
West Virginia	255.8	129.3	385.1
All States	5,501.9	1,147.6	6,649.5

[1] 128 cubic feet of wood, bark, and air space.

Table 2.—Total production and receipts of pulpwood in the Northeast, by States and species groups, 1970

(In thousands of rough cords)

State	Total production		Total receipts		Production surplus (+) or deficit (—)
	Softwood	Hardwood	Softwood	Hardwood	
Connecticut	6.1	7.4	(D)	(D)	+(D)
Delaware	59.1	4.7	—	—	+63.8
Kentucky	26.3	213.3	55.7	218.9	—35.0
Maine	2,508.1	960.9	2,770.9	963.8	—265.7
Maryland	190.1	122.7	126.7	308.9	—122.8
Massachusetts	11.9	13.6	(D)	(D)	+(D)
New Hampshire	112.8	191.7	160.8	349.5	—205.8
New Jersey	38.4	9.0	42.6	23.0	—18.2
New York	100.7	409.1	202.4	426.8	—119.4
Ohio	13.4	330.4	3.1	437.7	—97.0
Pennsylvania	58.2	719.2	176.5	726.0	—125.1
Rhode Island	3.3	4.7	(D)	(D)	—(D)
Vermont	79.4	69.9	(D)	(D)	+(D)
West Virginia	73.3	311.8	—	—	+385.1
All States	3,281.1	3,368.4	3,580.7	3,484.7	—415.9

(D) Data withheld to avoid disclosure for individual mills.

Table 3.—Pulpwood production from roundwood in the Northeast, by States and species groups, 1970

(In thousands of rough cords)

State	Softwood				Hardwood				
	Cut and retained in State	Shipped to other States		Total softwood	Cut and retained in State	Shipped to other States		Total hardwood	Total production
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.5	2.4	—	5.9	—	7.4	—	7.4	13.3
Delaware	—	21.6	37.5	59.1	—	2.3	.9	3.2	62.3
Kentucky	.3	.1	21.2	21.6	33.3	36.5	23.8	93.6	115.2
Maine	2,282.6	33.6	4.0	2,320.2	827.7	73.0	—	900.7	3,220.9
Maryland	13.0	15.6	91.7	120.3	64.1	10.6	1.2	75.9	196.2
Massachusetts	—	8.8	—	8.8	—	5.6	—	5.6	14.4
New Hampshire	30.6	16.6	—	47.2	147.1	4.8	—	151.9	199.1
New Jersey	38.4	—	—	38.4	8.1	(*)	—	8.1	46.5
New York	93.9	.4	3.6	97.9	268.5	7.1	14.5	290.1	388.0
Ohio	—	13.4	—	13.4	230.3	8.1	—	238.4	251.8
Pennsylvania	46.7	2.6	—	49.3	521.4	36.4	—	557.8	607.1
Rhode Island	3.3	—	—	3.3	3.2	—	—	3.2	6.5
Vermont	13.3	62.4	—	75.7	—	49.1	—	49.1	124.8
West Virginia	—	58.6	9.7	68.3	—	123.3	64.2	187.5	255.8
All States	2,525.6	236.1	167.7	2,929.4	2,103.7	364.2	104.6	2,572.5	5,501.9

* Less than 50 cords.

Table 4.—Pulpwood chip production from plant residues in the Northeast by States and species groups, 1970[1]

(In thousands of rough cords)

State	Softwood				Hardwood				
	Produced and retained in State	Shipped to other States		Total softwood	Produced and retained in State	Shipped to other States		Total hardwood	Total production
		In Northeast	Outside Northeast			Outside Northeast	In Northeast		
Connecticut	0.2	—	—	0.2	—	—	—	—	0.2
Delaware	—	—	—	—	—	1.5	—	1.5	1.5
Kentucky	—	2.1	2.6	4.7	73.8	14.8	31.1	119.7	124.4
Maine	182.6	5.3	—	187.9	55.6	4.6	—	60.2	248.1
Maryland	.2	49.4	20.2	69.8	6.3	40.5	—	46.8	116.6
Massachusetts	—	3.1	—	3.1	3.4	4.6	—	8.0	11.1
New Hampshire	42.2	23.4	—	65.6	31.7	8.1	—	39.8	105.4
New Jersey	—	—	—	—	.6	.3	—	.9	.9
New York	1.3	1.4	.1	2.8	79.6	16.7	22.7	119.0	121.8
Ohio	—	—	—	—	91.6	.4	—	92.0	92.0
Pennsylvania	7.7	1.2	—	8.9	127.9	33.5	—	161.4	170.3
Rhode Island	—	—	—	—	—	1.5	—	1.5	1.5
Vermont	—	3.7	—	3.7	—	20.7	.1	20.8	24.5
West Virginia	—	3.1	1.9	5.0	—	76.1	48.2	124.3	129.3
All States	234.2	92.7	24.8	351.7	470.5	223.3	102.1	795.9	1,147.6

[1] Includes sawmill slabs and edgings, veneer cores, and post and pole trimmings.

Table 5.—Pulpwood receipts from roundwood in the Northeast by States, and species groups, 1970

(In thousands of rough cords)

State	Softwood				Hardwood				
	Cut and retained in State	Receipts from other States		Total softwood	Cut and retained in State	Receipts from other States		Total hardwood	Total receipts
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	3.5	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Delaware	—	—	—	—	—	—	—	—	—
Kentucky	.3	—	54.2	54.5	33.3	—	30.0	63.3	117.8
Maine	2,282.6	8.8	252.1	2,543.5	827.7	5.0	71.5	904.2	3,447.7
Maryland	13.0	59.9	50.2	123.1	64.1	147.4	20.8	232.3	355.4
Massachusetts	—	—	—	—	—	—	—	—	—
New Hampshire	30.6	40.8	12.8	84.2	147.1	110.7	39.7	297.5	381.7
New Jersey	38.4	—	—	38.4	8.1	—	—	8.1	46.5
New York	93.9	62.7	44.5	201.1	268.5	16.6	23.1	308.2	509.3
Ohio	—	—	—	—	230.3	43.1	12.6	286.0	286.0
Pennsylvania	46.7	52.4	12.9	112.0	521.4	29.2	2.3	552.9	664.9
Rhode Island	3.3	(D)	—	(D)	3.2	(D)	—	(D)	(D)
Vermont	13.3	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
West Virginia	—	—	—	—	—	—	—	—	—
All States	2,525.6	236.1	431.9	3,193.6	2,103.7	364.4	200.0	2,668.1	5,861.7

(D) Data withheld to avoid disclosure for individual mills.

Table 6.—Pulpwood chip receipts from plant residues in the Northeast by States and species groups, 1970[1]

(In thousands of rough cord equivalents)

State[2]	Softwood				Hardwood				Total receipts
	Produced and retained in State	Receipts from other States		Total softwood	Produced and retained in State	Receipts from other States		Total hardwood	
		In Northeast	Outside Northeast			In Northeast	Outside Northeast		
Connecticut	0.2	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
Kentucky	—	—	1.2	1.2	73.8	—	81.8	155.6	156.8
Maine	182.6	24.0	20.8	227.4	55.6	.9	3.1	59.6	287.0
Maryland	.2	3.4	(*)	3.6	6.3	67.4	2.9	76.6	80.2
Massachusetts	—	(D)	(D)	(D)	3.4	(D)	(D)	(D)	(D)
New Hampshire	42.2	7.1	27.3	76.6	31.7	8.8	11.5	52.0	128.6
New Jersey	—	4.2	—	4.2	.6	14.3	—	14.9	19.1
New York	1.3	—	—	1.3	79.6	23.8	15.2	118.6	119.9
Ohio	—	3.1	—	3.1	91.6	52.4	7.7	151.7	154.8
Pennsylvania	7.7	45.9	10.9	64.5	127.9	44.7	.5	173.1	237.6
Rhode Island	—	(D)	(D)	(D)	—	(D)	(D)	(D)	(D)
All States	234.2	92.7	60.2	387.1	470.5	223.4	122.7	816.6	1,203.7

[1] Includes sawmill slabs and edgings, veneer cores, and post and pole trimmings.
[2] States with no receipts are omitted.
(D) Data withheld to avoid disclosure for individual mills.
(*) Less than 50 cords.

Table 7.—Pulpwood from roundwood received from States outside the Northeast, by States (or provinces) of origin and species groups, 1970

(In thousands of rough cords)

Receiving State[1]	State (or province) of origin	Total softwood	Total hardwood	All species
Kentucky	Alabama	0.9	0.2	1.1
	Illinois	—	1.1	1.1
	Indiana	—	5.6	5.6
	Mississippi	44.5	7.7	52.2
	Missouri	.3	5.6	5.9
	Tennessee	8.5	9.8	18.3
Maine	New Brunswick	227.0	60.5	287.5
	Quebec	25.1	11.0	36.1
Maryland	Virginia	50.2	20.8	71.0
New Hampshire	New Brunswick	6.5	—	6.5
	New Brunswick	6.3	39.7	46.0
New York	Quebec	1.8	—	1.8
	Ontario	.7	11.4	12.1
	Quebec	42.0	11.7	53.7
Ohio	Alabama	—	.7	.7
	Indiana	—	9.1	9.1
	Michigan	—	2.0	2.0
	North Carolina	—	.8	.8
Pennsylvania	Ontario	2.2	—	2.2
	Virginia	10.7	2.3	13.0
Vermont	Quebec	5.2	—	5.2
All States		431.9	200.0	631.9

[1] States with no receipts are omitted.

Table 8.—Pulpwood chip receipts from wood-using plants outside the Northeast, by States (or provinces) of origin and species groups, 1970

(In thousands of rough cords)

Receiving State[1]	State (or province) of origin	Total softwood	Total hardwood	All species
Kentucky	Alabama	—	0.3	0.3
	Arkansas	0.2	—	.2
	Illinois	.3	5.9	6.2
	Indiana	—	17.8	17.8
	Mississippi	.1	3.1	3.2
	Missouri	.5	13.9	14.4
	Tennessee	.1	40.8	40.9
Maine	New Brunswick	6.8	1.2	8.0
	Quebec	14.0	1.9	15.9
Maryland	Virginia	(*)	2.9	2.9
New Hampshire	Quebec	27.3	11.5	38.8
New York	Ontario	—	12.0	12.0
	Quebec	—	3.2	3.2
Ohio	Indiana	—	1.1	1.1
	Tennessee	—	.5	.5
	Virginia	—	6.1	6.1
Pennsylvania	Virginia	10.9	.5	11.4
All States		60.2	122.7	182.9

[1] States with no receipts are omitted.
(*) Less than 50 cords.

Table 9.—Pulpwood production from roundwood in the Northeast, by States and species groups, 1970

(In thousands of rough cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hard-woods[1]	Total	
Connecticut	—	—	5.9	5.9	—	2.9	4.5	7.4	13.3
Delaware	—	—	59.1	59.1	—	1.1	2.1	3.2	62.3
Kentucky	(*)	(*)	21.6	21.6	3.2	40.3	50.1	93.6	115.2
Maine	1,914.0	259.5	146.7	2,320.2	45.1	41.7	813.9	900.7	3,220.9
Maryland	.2	.6	119.5	120.3	7.2	60.3	8.4	75.9	196.2
Massachusetts	—	—	8.8	8.8	—	2.3	3.3	5.6	14.4
New Hampshire	36.6	7.5	3.1	47.2	1.6	—	150.3	151.9	199.1
New Jersey	—	—	38.4	38.4	—	—	8.1	8.1	46.5
New York	66.9	8.5	22.5	97.9	17.8	10.1	262.2	290.1	388.0
Ohio	.6	.7	12.1	13.4	13.3	77.4	147.7	238.4	251.8
Pennsylvania	.1	6.5	42.7	49.3	66.3	164.5	327.0	557.8	607.1
Rhode Island	—	—	3.3	3.3	—	2.3	.9	3.2	6.5
Vermont	68.6	3.0	4.1	75.7	9.3	.4	39.4	49.1	124.8
West Virginia	8.9	5.6	53.8	68.3	31.6	140.1	15.8	187.5	255.8
All States	2,095.9	291.9	541.6	2,929.4	195.4	543.4	1,833.7	2,572.5	5,501.9

[1] Chiefly maple, beech, gums, elms, and birch species.

* Less than 50 cords.

Table 10.—Pulpwood production from roundwood in southern New England by States and countries and species groups, 1970

(In thousands of rough cords)

State county[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Connecticut:	—	—	5.9	5.9	—	2.9	4.5	7.4	13.3
Hartford	—	—	1.6	1.6	—	—	—	—	1.6
Litchfield	—	—	(*)	(*)	—	—	—	—	(*)
Middlesex	—	—	.6	.6	—	—	—	—	.6
New Haven	—	—	.3	.3	—	—	—	—	.3
New London	—	—	.6	.6	—	.4	2.9	3.3	3.9
Tolland	—	—	1.3	1.3	—	.2	—	.2	1.5
Windham	—	—	1.5	1.5	—	2.3	1.6	3.9	5.4
Massachusetts:	—	—	8.8	8.8	—	2.3	3.3	5.6	14.4
Barnstable	—	—	.1	.1	—	—	—	—	.1
Berkshire	—	—	—	—	—	.1	.6	.7	.7
Bristol	—	—	2.1	2.1	—	.6	.7	1.3	3.4
Franklin	—	—	—	—	—	(*)	(*)	(*)	(*)
Plymouth	—	—	6.5	6.5	—	1.6	2.0	3.6	10.1
Worcester	—	—	.1	.1	—	—	—	—	.1
Rhode Island:	—	—	3.3	3.3	—	2.3	.9	3.2	6.5
Kent	—	—	1.0	1.0	—	1.4	.4	1.8	2.8
Providence	—	—	1.8	1.8	—	.5	.3	.8	2.6
Washington	—	—	.5	.5	—	.4	.2	.6	1.1

[1] Counties with no production are omitted.
(*) Less than 50 cords.

Table 11.—Pulpwood production from roundwood in Delaware and New Jersey by States and counties and species groups, 1970

(In thousands of rough cords)

State county[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Delaware:	—	—	59.1	59.1	—	1.1	2.1	3.2	62.3
Kent	—	—	1.1	1.1	—	—	—	—	1.1
Sussex	—	—	58.0	58.0	—	1.1	2.1	3.2	61.2
New Jersey:	—	—	38.4	38.4	—	—	8.1	8.1	46.5
Atlantic	—	—	3.8	3.8	—	—	.2	.2	4.0
Burlington	—	—	15.1	15.1	—	—	3.9	3.9	19.0
Camden	—	—	7.6	7.6	—	—	1.5	1.5	9.1
Cape May	—	—	.6	.6	—	—	(*)	(*)	.6
Gloucester	—	—	7.4	7.4	—	—	2.5	2.5	9.9
Ocean	—	—	3.9	3.9	—	—	—	—	3.9
Warren	—	—	—	—	—	—	(*)	(*)	(*)

[1] Counties with no production are omitted.

(*) Less than 50 cords

Table 12.—Pulpwood production from roundwood in Kentucky by counties and species groups, 1970

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Ballard	—	—	0.3	0.3	0.5	2.8	1.4	4.7	5.0
Bath	—	—	.3	.3	.4	.9	.2	1.5	1.8
Boyd	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Breckinridge	—	—	—	—	—	.8	.4	1.2	1.2
Calloway	—	—	—	—	(*)	(*)	.2	.2	.2
Carlisle	—	—	—	—	.3	2.0	1.0	3.3	3.3
Carter	(*)	(*)	2.0	2.0	.3	.6	2.0	2.9	4.9
Clay	—	—	—	—	—	.1	.3	.4	.4
Crittenden	—	—	—	—	(*)	.3	.1	.4	.4
Daviess	—	—	—	—	—	1.2	.6	1.8	1.8
Elliott	—	—	(*)	(*)	—	—	.1	.1	.1
Fleming	—	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Floyd	—	—	—	—	—	—	(*)	(*)	(*)
Fulton	—	—	(*)	(*)	.1	.4	.2	.7	.7
Graves	—	—	—	—	.3	1.6	.8	2.7	2.7
Grayson	—	—	—	—	—	2.5	1.1	3.6	3.6
Greenup	—	—	—	—	.5	1.5	.3	2.3	2.3
Green	—	—	.1	.1	(*)	.1	9.0	9.1	9.2

Hancock	—	—	—	—	—	3.2	1.4	4.6	4.6
Henderson	—	—	—	—	—	(*)	(*)	(*)	(*)
Hickman	—	—	(*)	(*)	.2	1.1	.6	1.9	1.9
Hopkins	—	—	—	—	—	.4	.4	.8	.8
Laurel	—	—	5.4	5.4	—	3.2	1.1	4.3	9.7
Lawrence	—	—	.5	.5	—	—	1.3	1.3	1.8
Lee	—	—	—	—	—	—	1.6	1.6	1.6
Lewis	—	—	.1	.1	.1	.3	11.1	11.5	11.6
Lincoln	—	—	—	—	—	(*)	1.2	1.2	1.2
McCracken	—	—	—	—	(*)	.3	.1	.4	.4
McCreary	—	—	4.8	4.8	.4	2.0	1.1	3.5	8.3
McLean	—	—	—	—	—	2.3	.7	3.0	3.0
Marshall	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Meade	—	—	—	—	—	(*)	(*)	(*)	(*)
Menifee	—	—	.5	.5	.1	.3	.1	.5	1.0
Montgomery	—	—	(*)	(*)	—	—	—	—	(*)
Morgan	—	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Muhlenberg	—	—	—	—	—	4.7	2.2	6.9	6.9
Ohio	—	—	—	—	—	.6	.3	.9	.9
Pulaski	—	—	.7	.7	(*)	—	—	—	.7
Rowan	—	—	.1	.1	—	(*)	6.4	6.4	6.5
Wayne	—	—	1.3	1.3	(*)	—	—	—	1.3
Whitley	—	—	5.5	5.5	—	7.1	2.8	9.9	15.4
Total	(*)	(*)	21.6	21.6	3.2	40.3	50.1	93.6	115.2

[1] Counties with no production are omitted.
(*) Less than 50 cords

Table 13.—Pulpwood production from roundwood in Maine by counties and species groups, 1970

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Androscoggin	5.8	5.6	15.9	27.3	0.2	6.1	13.5	19.8	47.1
Aroostook	621.2	15.8	.1	637.1	20.0	—	49.1	69.1	706.2
Cumberland	2.8	3.2	16.2	22.2	(*)	6.1	21.1	27.2	49.4
Franklin	59.2	9.3	7.6	76.1	—	4.0	99.8	103.8	179.9
Hancock	53.9	9.7	5.2	68.8	.3	2.0	14.7	17.0	85.8
Kennebec	11.4	8.0	14.0	33.4	.2	1.6	27.9	29.7	63.1
Knox	13.2	2.9	4.6	20.7	(*)	1.6	6.8	8.4	29.1
Lincoln	12.2	4.2	15.7	32.1	(*)	1.6	14.6	16.2	48.3
Oxford	40.6	23.7	16.2	80.5	.9	5.0	152.3	158.2	238.7
Penobscot	250.7	72.5	5.0	328.2	11.1	—	136.4	147.5	475.7
Piscataquis	350.6	14.4	2.6	367.6	3.6	1.6	75.4	80.6	448.2
Sagadahoc	3.5	2.3	8.3	14.1	.1	2.2	2.1	4.4	18.5
Somerset	282.2	15.1	5.9	303.2	.2	—	67.3	67.5	370.7
Waldo	20.7	13.8	9.0	43.5	.8	1.6	29.8	32.2	75.7
Washington	185.7	58.8	14.7	259.2	7.7	2.3	91.3	101.3	360.5
York	.3	.2	5.7	6.2	(*)	6.0	11.8	17.8	24.0
Total	1,914.0	259.5	146.7	2,320.2	45.1	41.7	813.9	900.7	3,220.9

(*) Less than 50 cords

Table 14.—Pulpwood production from roundwood in Maryland by counties and species groups, 1970

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Allegany	0.1	0.2	1.7	2.0	—	27.0	1.8	28.8	30.8
Anne Arundel	—	—	4.0	4.0	3.5	—	—	3.5	7.5
Baltimore	—	—	(*)	(*)	—	.2	.1	.3	.3
Calvert	(*)	.1	4.8	4.9	—	.1	(*)	.1	5.0
Caroline	—	—	3.4	3.4	—	(*)	.4	.4	3.8
Carroll	—	—	.1	.1	—	(*)	—	(*)	.1
Cecil	—	—	—	—	—	2.6	2.2	4.8	4.8
Charles	—	—	4.2	4.2	—	.1	.1	.2	4.4
Dorchester	—	—	15.9	15.9	—	.2	.8	1.0	16.9
Frederick	—	—	—	—	—	.4	.2	.6	.6
Garrett	.1	.1	.9	1.1	3.7	27.3	1.6	32.6	33.7
Harford	—	—	—	—	—	(*)	—	(*)	(*)
Howard	—	—	.1	.1	—	(*)	—	(*)	.1
Kent	—	—	—	—	—	(*)	—	(*)	(*)
Montgomery	—	—	—	—	—	(*)	—	(*)	(*)
Prince Georges	—	—	1.0	1.0	—	.2	.2	.4	1.4
Queen Annes	—	—	.3	.3	—	—	—	—	.3
St. Marys	(*)	.1	.5	.6	—	—	—	—	.6
Somerset	—	—	17.3	17.3	(*)	(*)	—	(*)	17.3
Talbot	—	—	1.4	1.4	—	(*)	—	(*)	1.4
Washington	(*)	.1	1.5	1.6	(*)	1.7	.8	2.5	4.1
Wicomico	—	—	21.2	21.2	(*)	.3	.2	.5	21.7
Worcester	—	—	41.2	41.2	—	.2	—	.2	41.4
Total	0.2	0.6	119.5	120.3	7.2	60.3	8.4	75.9	196.2

[1] Counties with no production are omitted.

(*) Less than 50 cords

Table 15.—Pulpwood production from roundwood in New Hampshire by counties and species groups, 1970

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Belknap	—	—	0.2	0.2	—	—	—	—	0.2
Carroll	1.6	2.1	1.0	4.7	(*)	—	6.7	6.7	11.4
Cheshire	—	(*)	—	(*)	—	—	—	—	(*)
Coos	32.0	4.4	.8	37.2	1.6	—	141.1	142.7	179.9
Grafton	2.9	1.0	1.1	5.0	(*)	—	2.5	2.5	7.5
Hillsboro	—	—	(*)	(*)	(*)	—	(*)	(*)	(*)
Merrimack	—	(*)	(*)	(*)	—	—	(*)	(*)	(*)
Rockingham	—	—	(*)	(*)	—	—	(*)	(*)	(*)
Strafford	—	—	(*)	(*)	—	—	(*)	(*)	(*)
Sullivan	.1	—	—	.1	—	—	—	—	.1
Total	36.6	7.5	3.1	47.2	1.6	—	150.3	151.9	199.1

(*) Less than 50 cords

Table 16.—Pulpwood production from roundwood in New York by counties and species groups, 1970

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	—	—	—	—	—	0.1	0.4	0.5	0.5
Broome	—	—	—	—	(*)	—	2.2	2.2	2.2
Cattaraugus	—	—	—	—	4.5	—	.2	4.7	4.7
Cayuga	—	—	—	—	.1	—	.7	.8	.8
Chautauqua	—	—	—	—	.2	—	.9	1.1	1.1
Chemung	—	—	0.1	0.1	—	—	—	—	.1
Chenango	1.3	—	.5	1.8	.1	—	2.4	2.5	4.3
Clinton	4.9	1.2	2.4	8.5	.6	—	24.2	24.8	33.3
Columbia	—	—	—	—	—	(*)	.2	.2	.2
Cortland	(*)	—	.3	.3	(*)	—	.3	.3	.6
Delaware	.3	—	1.0	1.3	(*)	.2	3.5	3.7	5.0
Erie	—	—	—	—	.4	—	.3	.7	.7
Essex	1.1	—	—	1.1	2.2	.1	40.7	43.0	44.1
Franklin	13.1	1.2	2.6	16.9	1.9	(*)	9.3	11.2	28.1
Fulton	.7	—	.4	1.1	.1	1.7	19.4	21.2	22.3
Genesee	—	—	—	—	—	—	.1	.1	.1
Greene	—	—	—	—	—	.1	.3	.4	.4
Hamilton	8.7	(*)	—	8.7	.3	1.6	39.3	41.2	49.9
Herkimer	2.9	.2	.3	3.4	(*)	(*)	1.5	1.5	4.9
Jefferson	(*)	.1	1.2	1.3	(*)	—	2.0	2.0	3.3
Lewis	2.9	1.8	2.2	6.9	.5	—	14.8	15.3	22.2
Livingston	—	—	—	—	.2	—	—	.2	.2

CONTINUED

Table 16.—Continued

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Montgomery	(*)	.1	—	.1	—	.3	1.5	1.8	1.9
Niagara	—	—	—	—	—	—	.3	.3	.3
Oneida	1.2	.9	.8	2.9	.1	—	1.3	1.4	4.3
Onondaga	.4	.1	—	.5	(*)	—	.3	.3	.8
Orleans	—	—	—	—	.1	—	(*)	.1	.1
Oswego	(*)	.4	.9	1.3	—	—	1.4	1.4	2.7
Otsego	1.0	—	3.5	4.5	(*)	(*)	.7	.7	5.2
Rensselaer	—	—	—	—	—	1.1	5.7	6.8	6.8
St. Lawrence	26.9	2.5	4.0	33.4	.9	—	11.0	11.9	45.3
Saratoga	.6	(*)	1.6	2.2	1.7	1.0	19.7	22.4	24.6
Schenectady	—	—	—	—	—	(*)	.2	.2	.2
Schoharie	.1	—	.4	.5	(*)	.2	.9	1.1	1.6
Schuyler	—	—	—	—	.1	—	—	.1	.1
Steuben	—	—	—	—	.4	—	—	.4	.4
Sullivan	—	—	—	—	(*)	—	.4	.4	.4
Tioga	—	—	(*)	(*)	.8	.2	2.3	3.3	3.3
Ulster	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Warren	.7	—	.2	.9	1.7	2.0	33.4	37.1	38.0
Washington	.1	—	.1	.2	.4	1.5	20.0	21.9	22.1
Wayne	—	—	—	—	.1	—	—	.1	.1
Westchester	—	—	—	—	(*)	(*)	.1	.1	.1
Wyoming	—	—	—	—	.4	—	.3	.7	.7
Total	66.9	8.5	22.5	97.9	17.8	10.1	262.2	290.1	388.0

[1] Counties with no production are omitted.

(*) Less than 50 cords

Table 17. Pulpwood production from roundwood in Ohio by counties and species groups, 1970

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	—	—	—	—	2.8	2.8	2.8
Ashland	—	—	—	—	—	0.8	.6	1.4	1.4
Athens	—	—	—	—	1.0	3.3	.6	4.9	4.9
Belmont	—	—	—	—	.5	(*)	.5	1.0	1.0
Brown	(*)	(*)	(*)	(*)	.2	(*)	.2	.4	.4
Butler	—	—	—	—	.4	—	.5	.9	.9
Carroll	—	—	—	—	—	.4	—	.4	.4
Clermont	—	—	—	—	.2	—	.3	.5	.5
Clinton	—	—	—	—	1.1	.7	1.1	2.9	2.9
Coshocton	—	—	—	—	—	9.6	.4	10.0	10.0
Delaware	—	—	—	—	—	(*)	—	(*)	(*)
Erie	—	—	—	—	—	.7	1.0	1.7	1.7
Fairfield	—	—	—	—	.5	1.5	.3	2.3	2.3
Franklin	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Gallia	.3	.3	5.7	6.3	.1	3.7	7.1	10.9	17.2
Greene	—	—	—	—	.1	—	.2	.3	.3
Guernsey	—	—	—	—	—	6.3	—	6.3	6.3
Harrison	(*)	—	(*)	(*)	—	.4	—	.4	.4
Highland	—	—	—	—	.2	—	1.5	1.7	1.7
Hocking	—	—	—	—	3.6	12.4	5.5	21.5	21.5
Holmes	—	—	—	—	—	1.3	—	1.3	1.3
Huron	—	—	—	—	—	1.0	2.5	3.5	3.5
Jackson	—	.1	.4	.5	.7	2.6	30.0	33.3	33.8
Knox	—	—	—	—	(*)	2.5	(*)	2.5	2.5
Lawrence	.1	.1	1.9	2.1	.2	1.2	19.3	20.7	22.8

CONTINUED

Table 17.—Continued

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Licking	—	—	—	—	—	4.0	—	4.0	4.0
Lorain	—	—	—	—	—	.3	.6	.9	.9
Mahoning	(*)	(*)	.2	.2	—	—	—	—	.2
Meigs	.1	.1	2.2	2.4	.1	1.5	.9	2.5	4.9
Monroe	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Morgan	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Morrow	—	—	—	—	—	.1	—	.1	.1
Muskingum	—	—	—	—	—	5.7	—	5.7	5.7
Noble	—	—	—	—	—	.2	—	.2	.2
Perry	—	—	—	—	.6	3.4	.3	4.3	4.3
Pickaway	—	—	—	—	.3	.9	.2	1.4	1.4
Pike	—	—	—	—	(*)	(*)	17.5	17.5	17.5
Preble	—	—	—	—	.2	—	.3	.5	.5
Richland	—	—	—	—	—	.1	.1	.2	.2
Ross	—	—	—	—	.9	3.0	8.6	12.5	12.5
Scioto	(*)	(*)	(*)	(*)	.6	3.0	24.5	28.1	28.1
Seneca	—	—	—	—	—	.1	.1	.2	.2
Stark	—	—	—	—	—	.3	—	.3	.3
Tuscarawas	—	—	—	—	—	1.4	—	1.4	1.4
Vinton	(*)	(*)	(*)	(*)	1.5	5.0	19.8	26.3	26.3
Warren	—	—	—	—	.3	—	.4	.7	.7
Washington	.1	.1	1.7	1.9	(*)	(*)	(*)	(*)	1.9
Wayne	—	—	—	—	—	(*)	—	(*)	(*)
Wyandot	—	—	—	—	—	(*)	—	(*)	(*)
Total	0.6	0.7	12.1	13.4	13.3	77.4	147.7	238.4	251.8

[1] Counties with no production are omitted.

(*) Less than 50 cords.

Table 18.—Pulpwood production from roundwood in Pennsylvania by counties and species groups, 1970

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	0.3	0.3	—	3.8	1.9	5.7	6.0
Armstrong	—	—	—	—	0.2	.3	.1	.6	.6
Bedford	0.1	0.4	4.5	5.0	6.8	16.1	6.7	29.6	34.6
Berks	—	—	.1	.1	—	.4	.2	.6	.7
Blair	—	(*)	.4	.4	.1	1.5	4.4	6.0	6.4
Bradford	—	—	—	—	6.2	1.6	19.1	26.9	26.9
Butler	—	—	—	—	(*)	(*)	.3	.3	.3
Cambria	—	—	.6	.6	.4	4.1	3.0	7.5	8.1
Cameron	—	(*)	.1	.1	.6	2.3	6.2	9.1	9.2
Carbon	—	—	.1	.1	(*)	.2	.4	.6	.7
Centre	—	.8	2.7	3.5	1.5	15.3	7.8	24.6	28.1
Clarion	(*)	(*)	.1	.1	—	—	.6	.6	.7
Clearfield	(*)	1.7	5.3	7.0	2.0	11.9	31.8	45.7	52.7
Clinton	(*)	.2	1.0	1.2	.3	12.7	3.8	16.8	18.0
Columbia	—	—	.1	.1	.1	.6	1.9	2.6	2.7
Crawford	—	—	—	—	.8	—	—	.8	.8
Cumberland	—	—	.2	.2	—	2.9	1.5	4.4	4.6
Dauphin	—	—	.6	.6	—	.7	.2	.9	1.5
Elk	—	.2	.5	.7	7.6	4.8	26.5	38.9	39.6
Erie	—	—	.7	.7	—	—	4.5	4.5	5.2

CONTINUED

Table 18.—Continued

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Fayette	—	(*)	(*)	(*)	.5	.9	1.9	3.3	3.3
Forest	—	(*)	.5	.5	7.4	.1	13.7	21.2	21.7
Franklin	—	(*)	1.4	1.4	(*)	10.3	5.0	15.3	16.7
Fulton	—	(*)	2.7	2.7	.1	5.5	3.4	9.0	11.7
Greene	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Huntingdon	—	1.7	8.5	10.2	2.0	18.3	11.9	32.2	42.4
Indiana	—	(*)	1.2	1.2	.2	1.2	2.0	3.4	4.6
Jefferson	—	.8	2.6	3.4	.2	1.5	3.7	5.4	8.8
Juniata	—	.2	1.4	1.6	.1	3.0	.8	3.9	5.5
Lackawanna	—	—	—	—	(*)	.1	.3	.4	.4
Lancaster	—	—	—	—	—	.8	.6	1.4	1.4
Lawrence	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Lebanon	—	—	(*)	(*)	—	.7	.3	1.0	1.0
Luzerne	—	—	.2	.2	.1	1.6	2.5	4.2	4.4
Lycoming	—	.1	.3	.4	.6	16.7	7.2	24.5	24.9
McKean	—	.1	.2	.3	7.4	.1	34.0	41.5	41.8
Mercer	—	—	.2	.2	—	—	.2	.2	.4
Mifflin	—	.2	.5	.7	.2	1.2	.7	2.1	2.8
Monroe	—	—	.1	.1	.3	.1	3.3	3.7	3.8
Montour	—	—	(*)	(*)	(*)	1.0	.3	1.3	1.3
Northampton	—	—	—	—	(*)	—	.1	.1	.1
Northumberland	—	—	.2	.2	—	.4	.4	.8	1.0

Perry	—	(*)	1.0	1.0	—	2.0	.8	2.8	3.8
Pike	—	—	—	—	(*)	.1	.4	.5	.5
Potter	—	(*)	(*)	(*)	7.5	.5	8.7	16.7	16.7
Schuylkill	—	—	1.7	1.7	—	2.3	.9	3.2	4.9
Snyder	—	(*)	.4	.4	(*)	.6	.3	.9	1.3
Somerset	(*)	.1	.5	.6	2.2	5.0	2.4	9.6	10.2
Sullivan	—	—	(*)	(*)	5.3	1.0	20.4	26.7	26.7
Susquehanna	—	—	—	—	1.4	1.4	16.1	18.9	18.9
Tioga	—	(*)	(*)	(*)	1.3	.5	8.2	10.0	10.0
Union	—	910	.2	.2	(*)	2.2	.2	2.4	2.6
Venango	—	—	.1	.1	—	—	17.2	17.2	17.3
Warren	—	(*)	.2	.2	1.7	.6	20.9	23.2	23.4
Washington	—	—	(*)	(*)	—	(*)	(*)	(*)	(*)
Wayne	—	—	—	—	.4	.7	6.1	7.2	7.2
Westmoreland	(*)	(*)	.1	.1	(*)	(*)	(*)	(*)	.1
Wyoming	—	—	—	—	.8	1.1	9.3	11.2	11.2
York	—	—	1.2	1.2	(*)	3.8	1.9	5.7	6.9
Total	0.1	6.5	42.7	49.3	66.3	164.5	327.0	557.8	607.1

[1] Counties with no production are omitted.

(*) Less than 50 cords.

Table 19.—Pulpwood Production from roundwood in Vermont by counties and species groups, 1970

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Addison	0.4	—	0.1	0.5	0.2	—	1.1	1.3	1.8
Bennington	1.0	—	.1	1.1	—	0.1	2.7	2.8	3.9
Caledonia	6.5	0.8	1.3	8.6	.7	—	4.2	4.9	13.5
Chittenden	—	—	1.6	1.6	—	—	1.0	1.0	2.6
Essex	31.2	.7	.1	32.0	7.0	—	20.6	27.6	59.6
Franklin	.1	(*)	—	.1	—	—	.5	.5	.6
Lamoille	1.7	—	—	1.7	—	—	.3	.3	2.0
Orange	.7	(*)	(*)	.7	(*)	—	(*)	(*)	.7
Orleans	13.7	1.5	.1	15.3	1.1	—	4.3	5.4	20.7
Rutland	3.0	—	.1	3.1	.2	.3	3.4	3.9	7.0
Washington	.5	(*)	.1	.6	(*)	—	(*)	(*)	.6
Windham	3.8	(*)	.6	4.4	—	(*)	.6	.6	5.0
Windsor	6.0	(*)	(*)	6.0	.1	—	.7	.8	6.8
Total	68.6	3.0	4.1	75.7	9.3	0.4	39.4	49.1	124.8

[1] Counties with no production are omitted.

(*) Less than 50 cords.

Table 20.—Pulpwood production from roundwood in West Virginia by counties and species groups, 1970

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Berkeley	(*)	(*)	5.0	5.0	(*)	2.2	0.9	3.1	8.1
Boone	(*)	0.1	.5	.6	—	—	—	—	.6
Braxton	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Cabell	0.1	(*)	.2	.3	(*)	.1	(*)	.1	.4
Calhoun	(*)	(*)	(*)	(*)	(*)	(*)	—	(*)	(*)
Doddridge	(*)	(*)	(*)	(*)	0.1	.3	(*)	.4	.4
Fayette	(*)	—	(*)	(*)	(*)	.1	(*)	.1	.1
Gilmer	—	—	—	—	(*)	(*)	—	(*)	(*)
Grant	1.1	.6	4.1	5.8	4.2	20.2	1.7	26.1	31.9
Greenbrier	(*)	.4	2.7	3.1	6.0	21.0	3.0	30.0	33.1
Hampshire	1.7	.9	9.9	12.5	4.2	21.2	1.4	26.8	39.3
Hardy	.6	.3	1.9	2.8	2.1	10.2	.7	13.0	15.8
Harrison	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Jackson	.7	.4	2.6	3.7	(*)	.2	(*)	.2	3.9
Jefferson	(*)	(*)	(*)	(*)	(*)	(*)	—	(*)	(*)
Kanahwa	(*)	(*)	(*)	(*)	—	—	—	—	(*)
Lincoln	—	—	—	—	—	(*)	—	(*)	(*)
McDowell	—	—	—	—	(*)	(*)	—	(*)	(*)
Marion	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Mason	.5	.2	1.7	2.4	.1	.3	(*)	.4	2.8
Mercer	—	—	(*)	(*)	—	—	—	—	(*)
Mineral	.6	.3	2.1	3.0	2.9	14.2	.9	18.0	21.0

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Table 20.—Continued

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Mingo	—	(*)	(*)	(*)	—	(*)	—	(*)	(*)
Monroe	.1	.6	4.0	4.7	5.0	17.4	2.5	24.9	29.6
Morgan	.6	.3	8.0	8.9	.8	7.5	1.8	10.1	19.0
Nicholas	(*)	(*)	.1	.1	.1	.7	(*)	.8	.9
Pendleton	.1	(*)	.3	.4	.7	2.8	.3	3.8	4.2
Pleasants	.1	.1	.3	.5	(*)	.1	(*)	.1	.6
Pocahontas	.1	.2	1.3	1.6	1.6	5.9	.8	8.3	9.9
Preston	(*)	(*)	(*)	(*)	.5	2.2	.5	3.2	3.2
Putnam	.6	.3	2.0	2.9	.2	.7	(*)	.9	3.8
Raleigh	—	(*)	(*)	(*)	—	—	—	—	(*)
Randolph	.1	(*)	.3	.4	.5	2.5	.2	3.2	3.6
Ritchie	.2	.1	.6	.9	.2	.7	(*)	.9	1.8
Roane	(*)	(*)	(*)	(*)	(*)	.1	(*)	.1	.1
Summers	(*)	(*)	.4	.4	.3	.9	.1	1.3	1.7
Tucker	(*)	(*)	(*)	(*)	.6	2.5	.2	3.3	3.3
Tyler	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Wayne	.1	(*)	.3	.4	1.2	4.1	.7	6.0	6.4
Webster	(*)	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Wirt	.9	.5	3.2	4.6	.1	.6	(*)	.7	5.3
Wood	.7	.3	2.3	3.3	.2	1.4	.1	1.7	5.0
Total	8.9	5.6	53.8	68.3	31.6	140.1	15.8	187.5	255.8

[1] Counties with no production are omitted.
(*) Less than 50 cords.

ERRATA SHEET

for PULPWOOD PRODUCTION IN THE NORTHEAST—1969. By James T. Bones and David R. Dickson. USDA Forest Serv. Resource Bull. NE-22. Forest Exp. Sta., Upper Darby, Pa. 34 pp., illus. 1970.

The Pennsylvania wood chip production total contained in the 1969 pulpwood production report is incorrect. Wood chip production for the state should have been 184.2 thousand cords instead of the 336.4 thousand cords that appears in the report.

The following corrections should be made:

Page	*Change*	
	From	*To*
2—¶ 4, line 2	4 percent	2 percent
2—¶ 4, line 3	more than 3%	44,800 cords
2—¶ 4, line 4	6,220,600	6,068,400
3—Fig. 1, point on hardwood line for 1969	.884	.732
7—¶ 1, line 2	35 percent	19 percent
7—¶ 1, line 3	Pennsylvania	Maryland
7—¶ 1, line 3	These states	Ohio
7—¶ 1, line 4	their	its
7—Tabulation, line for Pennsylvania	336.4 +112	184.2 +16
7—Tabulation total	1273.0 +35	1120.8 +19
7—¶ 2, line 2	1,273,000	1,120,800
7—¶ 2, line 5	20 percent	18 percent
7—¶ 3, line 3	45.3 percent	20.3 percent
11—table 1, *Pennsylvania*	336.4 958.3	184.2 806.1
11—table 1, *All states*	1,273.0 6,220.6	1,120.8 6,068.4
12—table 2, *Pennsylvania*	891.6 892.5	739.4 740.3
12—table 2, *All states*	3,266.1 3,299.2	3,113.9 3,147.0
14—table 4, *Pennsylvania*	299.6 328.9 336.4	147.4 176.7 184.2
14—table 4, *All states*	557.7 884.2 1,273.0	405.5 732.0 1,120.8
16—table 6, *Pennsylvania*	299.6 340.6 389.8	147.4 188.4 237.6
16—table 6, *All states*	557.7 830.9 1,218.4	405.5 678.7 1,066.2

THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.